FOUNDRY TRADE JOURNAL

EST. 1902

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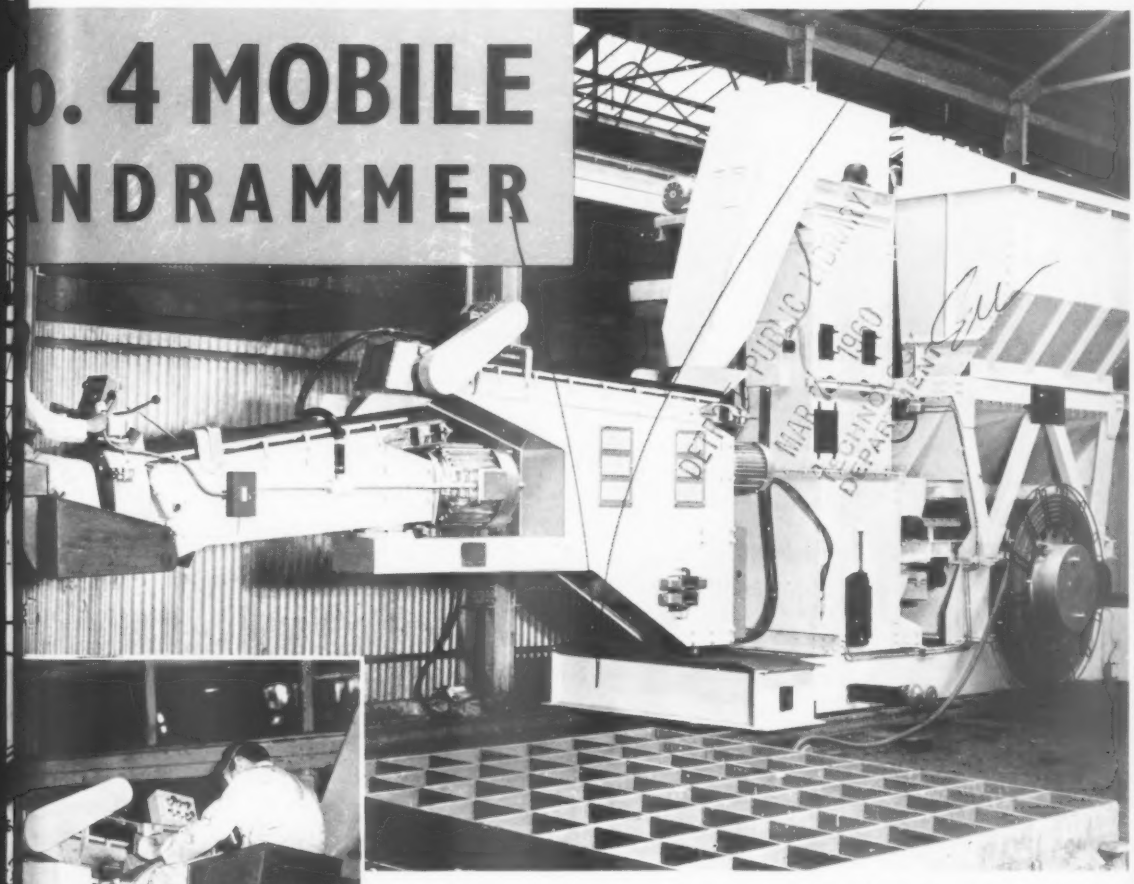

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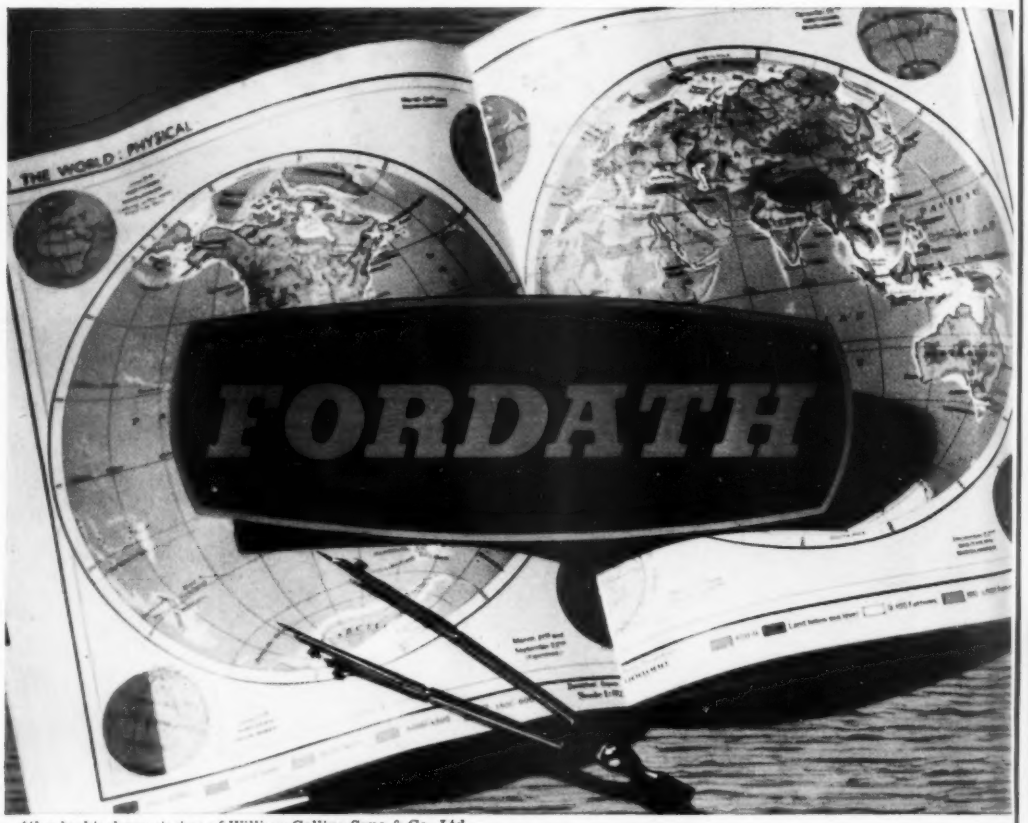

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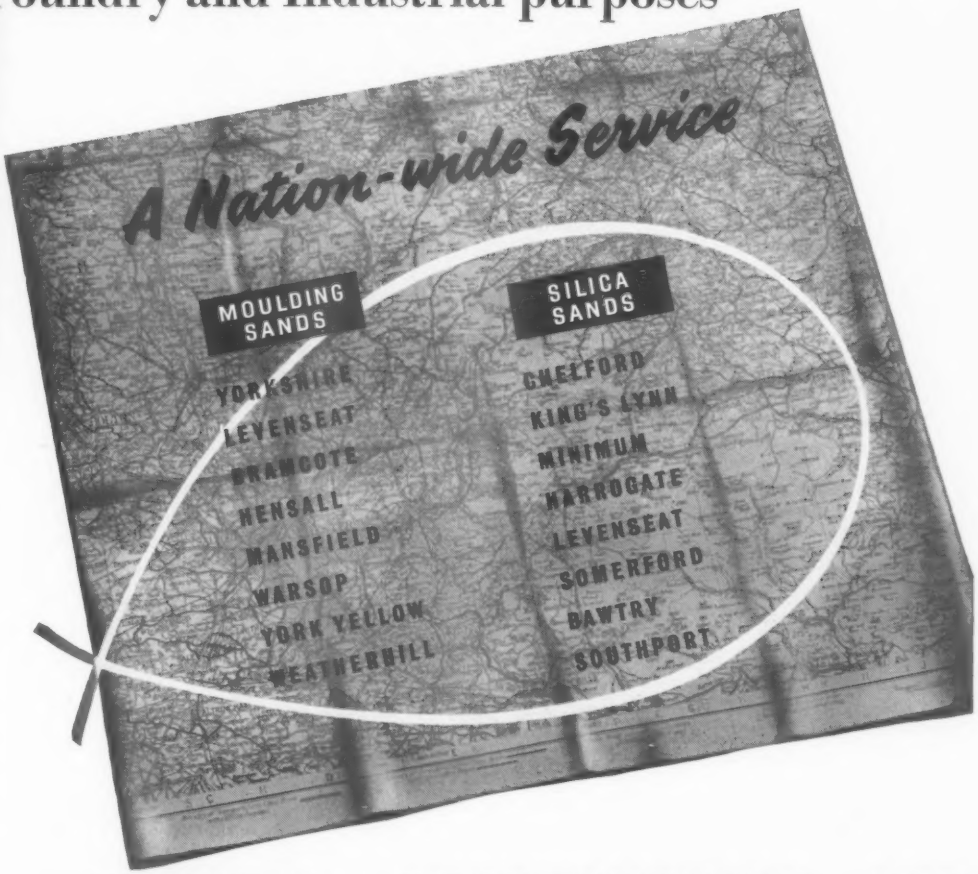

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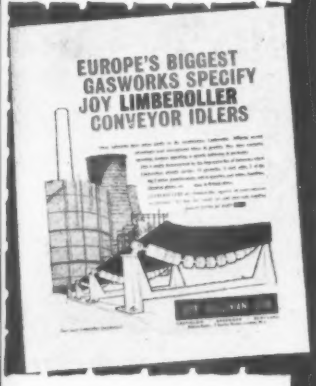

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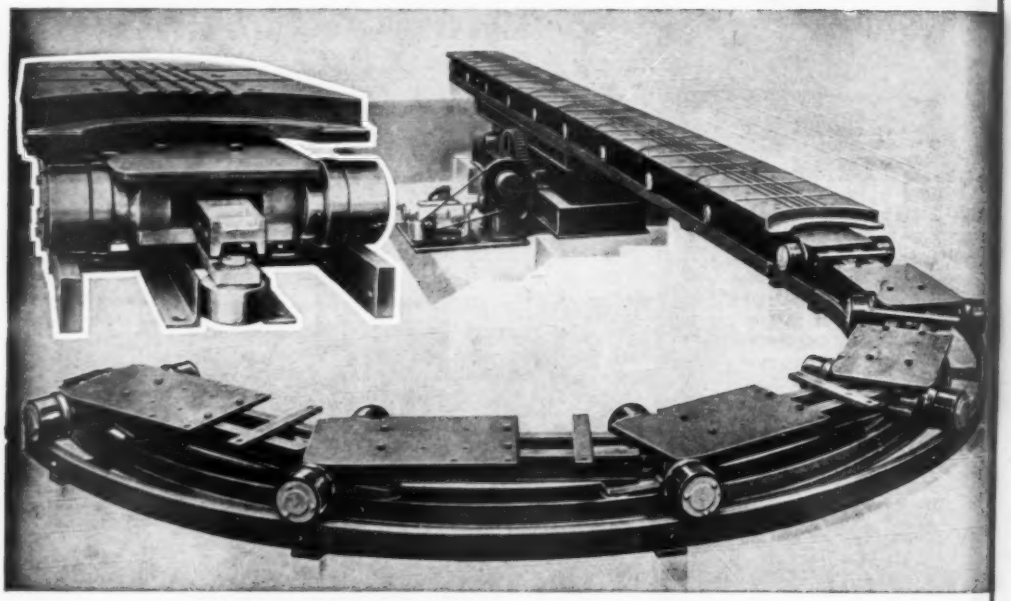

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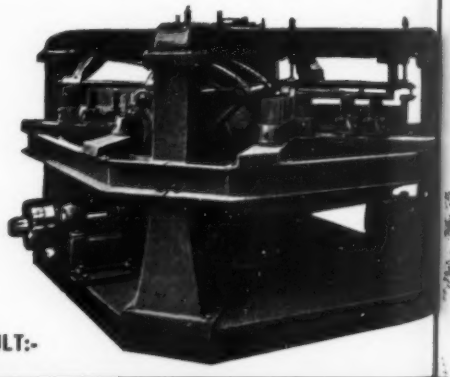

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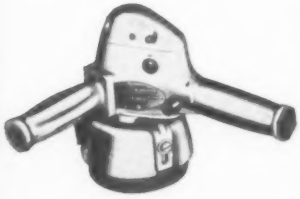

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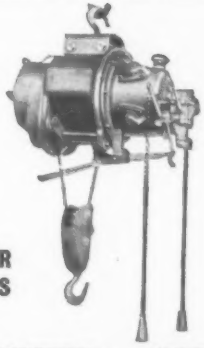

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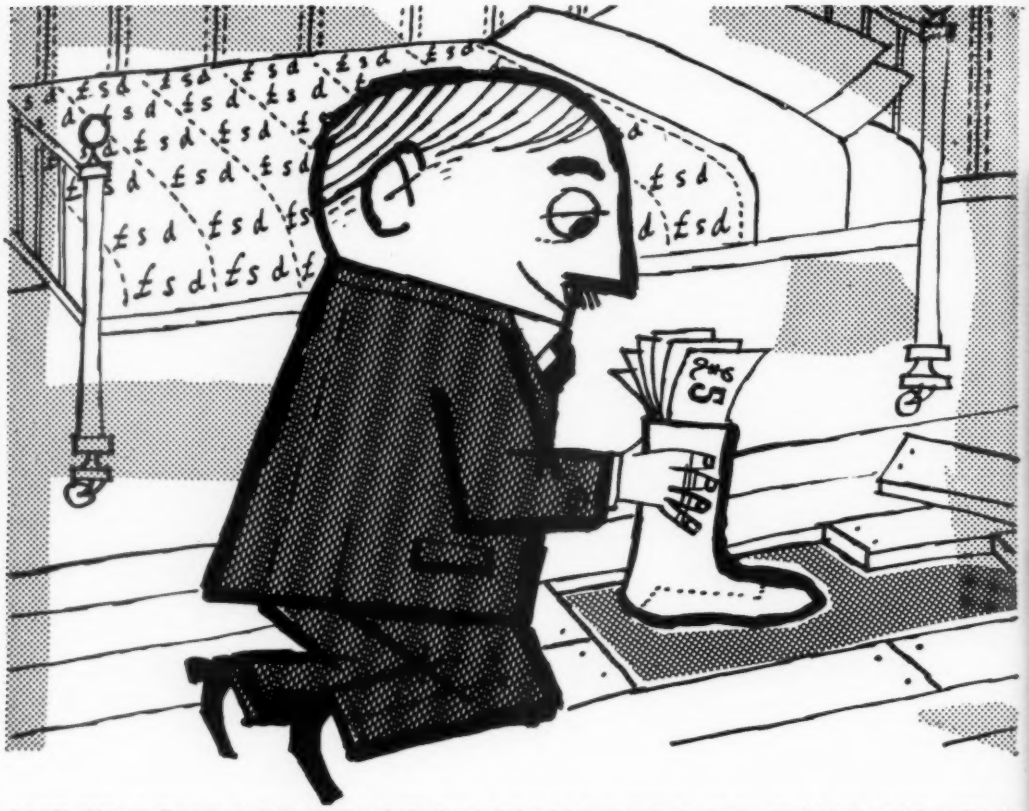

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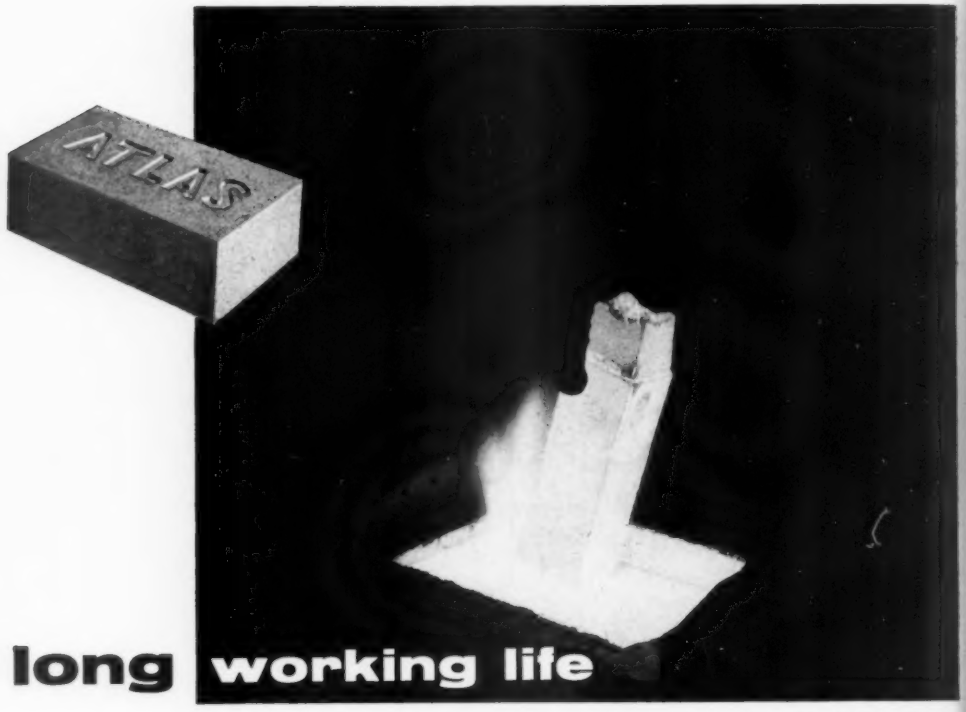

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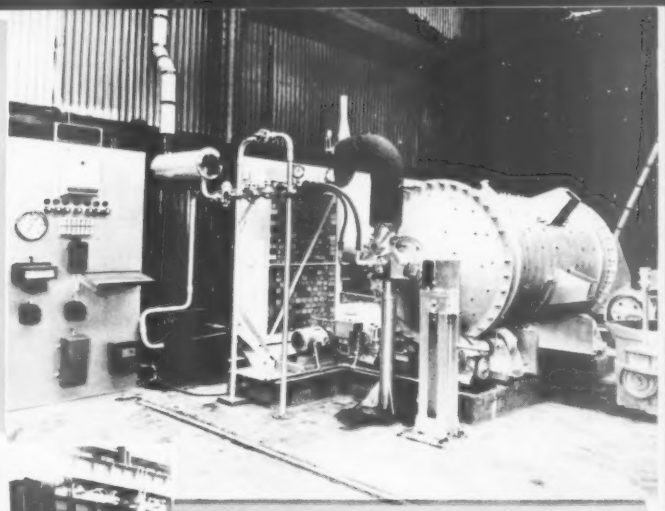

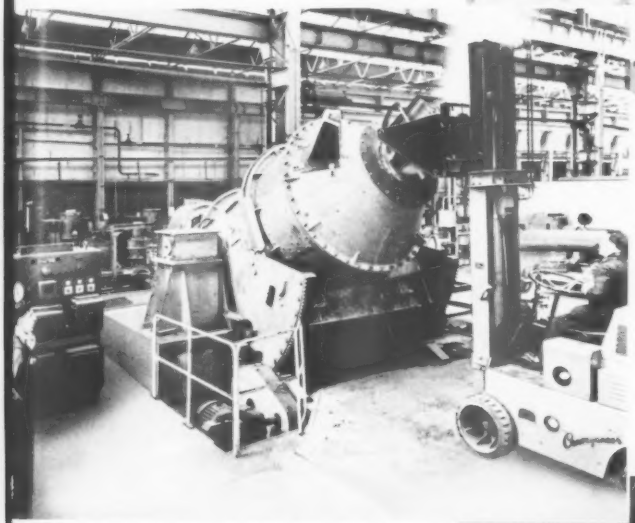

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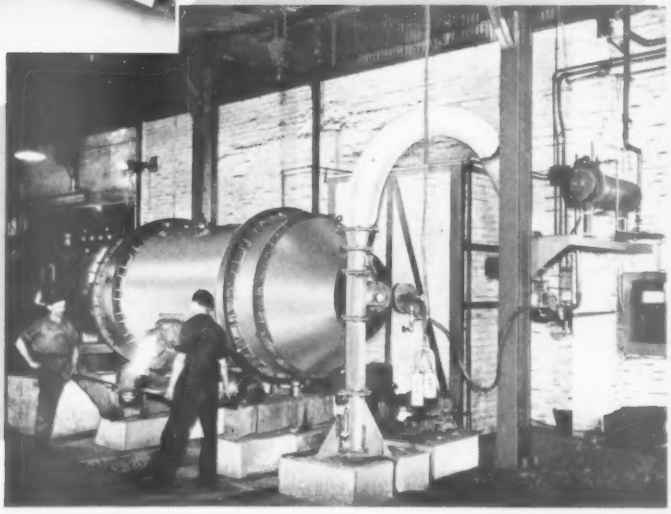

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As reported in many previous issues, Industrija Motora, Rakovica, nr. Belgrade, have been importing large quantities of diesel engines from F. Perkins Ltd., Peterborough, Northants., and also have an agreement to make the engines themselves under licence, for incorporation in Ferguson tractors (Massey-Ferguson, Eastern Hemisphere Division, Coventry) and in locally-developed Zadrugar tractors.

Illustration of plant supplied to Hindustan Motors Ltd., India

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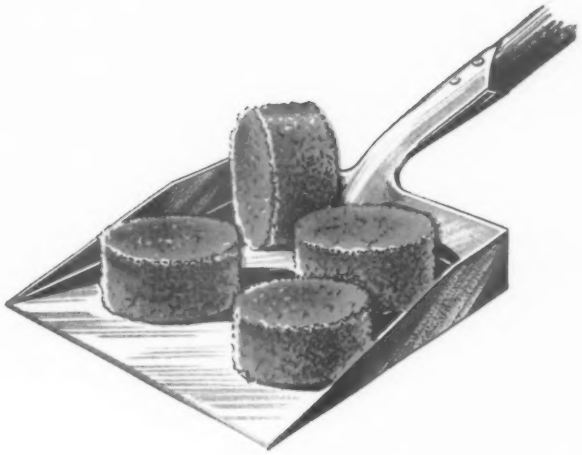

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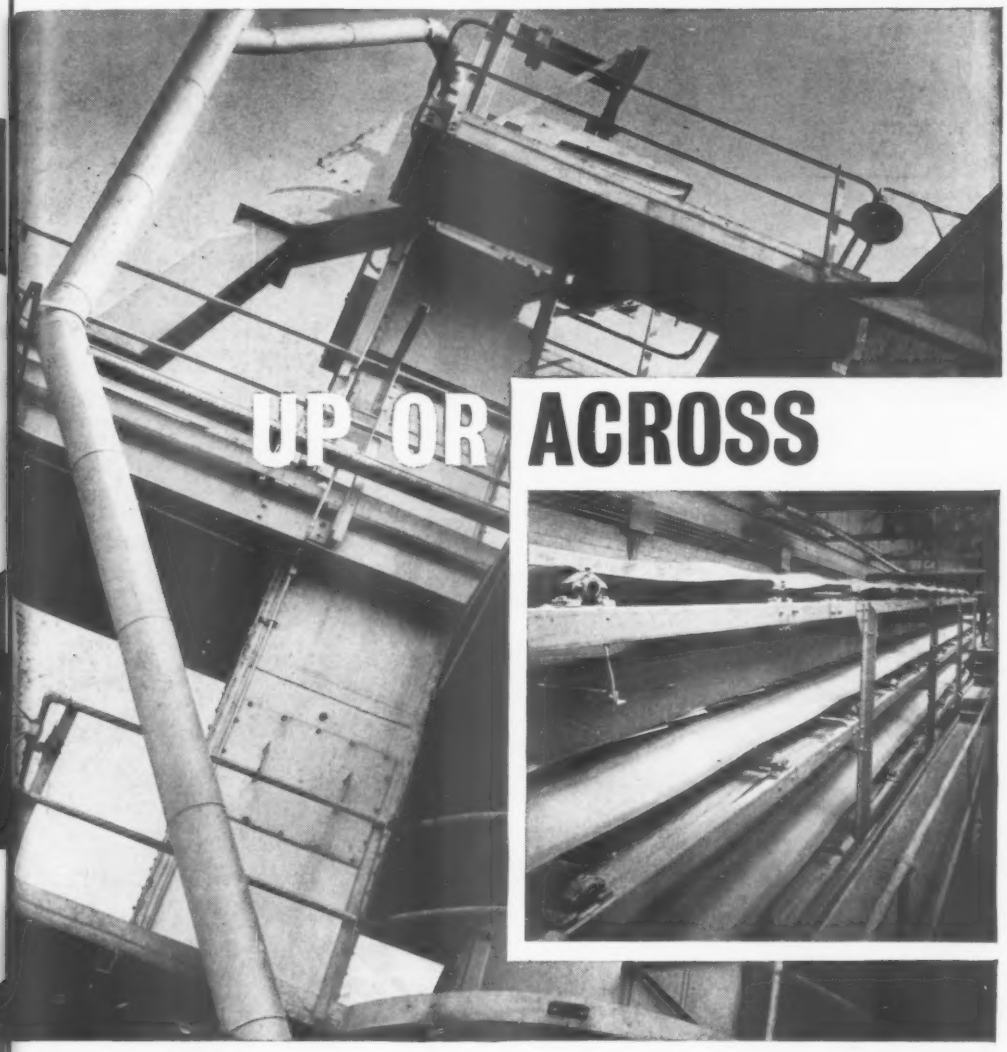

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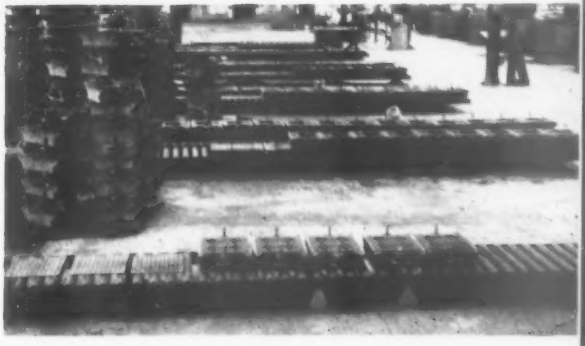

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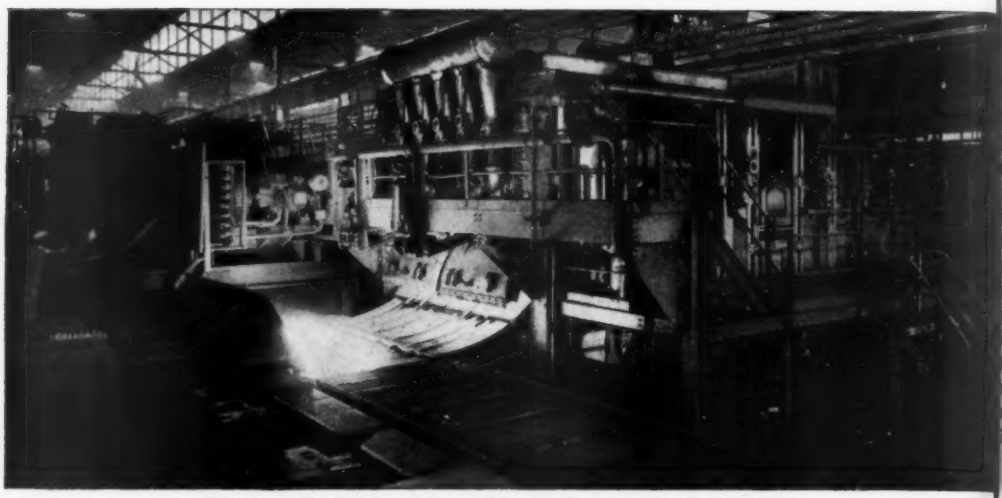

Fig. 1. A hot slab being ejected from the furnace on to the roller table.

THE GLAMOUR OF STAINLESS STEEL

Stainless Steel—a British discovery by Brearley in Sheffield in 1913, overcame the atavistic tendency of ordinary steels to return to iron oxide as rust.

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This glamour applies not only to Stainless Steel products, some of which are illustrated in this article, but also to its processing. In fact, the ultimate durability of Stainless Steel depends upon a precise temperature/time heating and reheating schedule, which processes are usually carried out by town gas because of its inherent flexibility as a heating medium.

Fig. 1 shows a close-up view of a slab heating furnas at Shepcote Lane Rolling Mills Limited—a subsidiar company of Firth-Vickers Stainless Steels Limited, i which Samuel Fox & Co. Limited have a one-thir interest. In the illustration a red hot slab has just bee ejected on to the run-out table. This furnace hea nine tons of slab hourly at a temperature of 1,230° before ejection, using 35,000 cubic feet of town ga per hour—each slab weighing approximately three ton The impressive machinery used to process Stainle Steel is shown in Fig. 2—the plant producing eithe matt or mirror-finished coiled strip. In the back ground are shown the gas-fired slab-heating furnac and the primary rolling section. The gas-fired co reheating furnaces and the automatically controlle four-high finishing mill together with the run-ou table are shown in the foreground.

Fig. 2. A general view of the hot mill bay showing furnaces, Steckel Mill and run-out table.

Fig. 3. The four-high hot Steckel Mill installed at Shepco Lane Rolling Mills Limited.

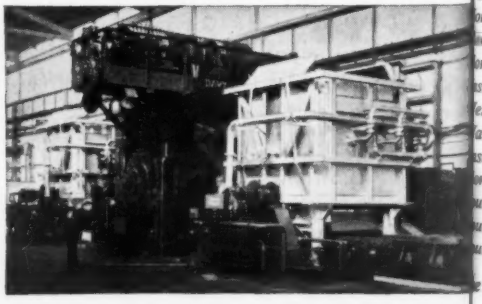

Fig. 3 shows the complex four-high Steckel Mill with adjacent coil reheating furnaces. Each furnace is rated at 8,000 cubic feet per hour, and the plant will roll up to nine passes with a drop in temperature of the steel of only 250°C.

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Fig. 4. A sterilising unit for surgical and dental instruments.

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The Gas Council, 1 Grosvenor Place, London, S.W.1

Fig. 5. Receiving and storage tanks for margarine blends in the processing department of Van Den Berghs & Jurgens Ltd., Stork Margarine Works, Purfleet.

Fig. 6. The Wimpy, Lyon's Corner House, Coventry Street, London.

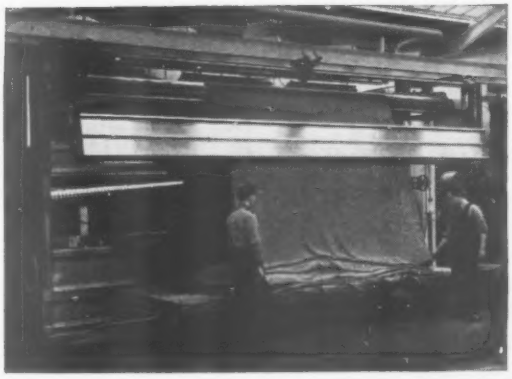

Fig. 7. The largest stainless steel carpet dyeing machine ever produced in Great Britain.

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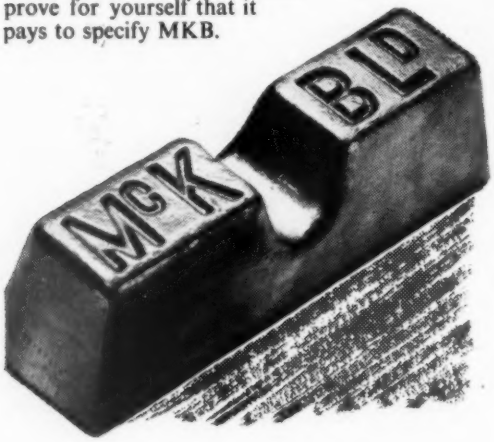

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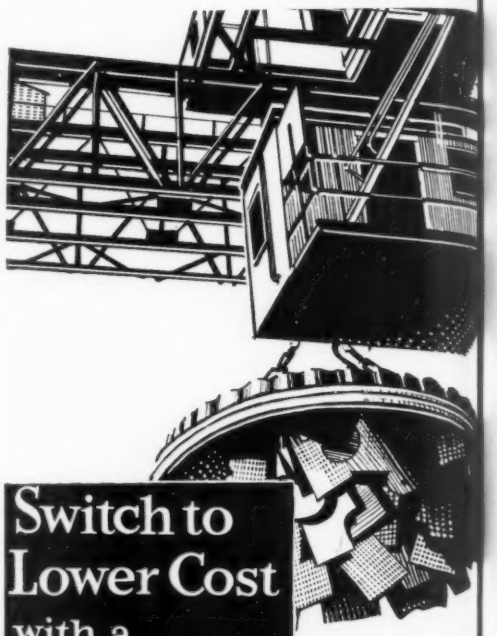

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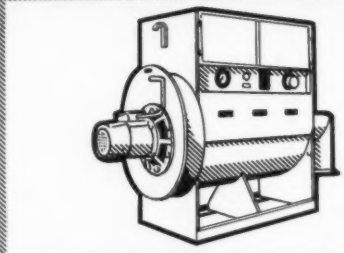

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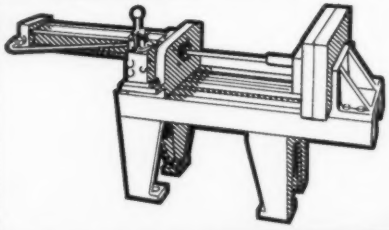

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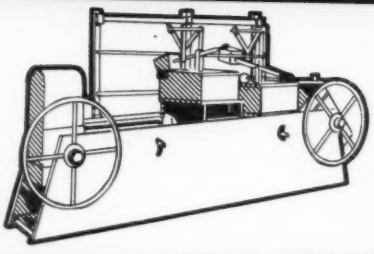

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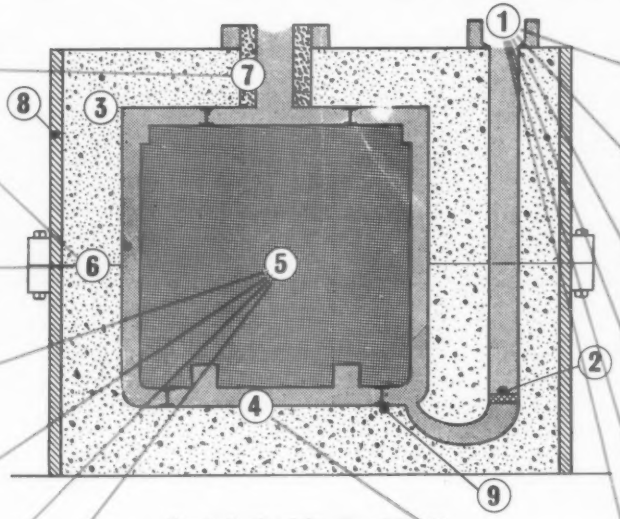

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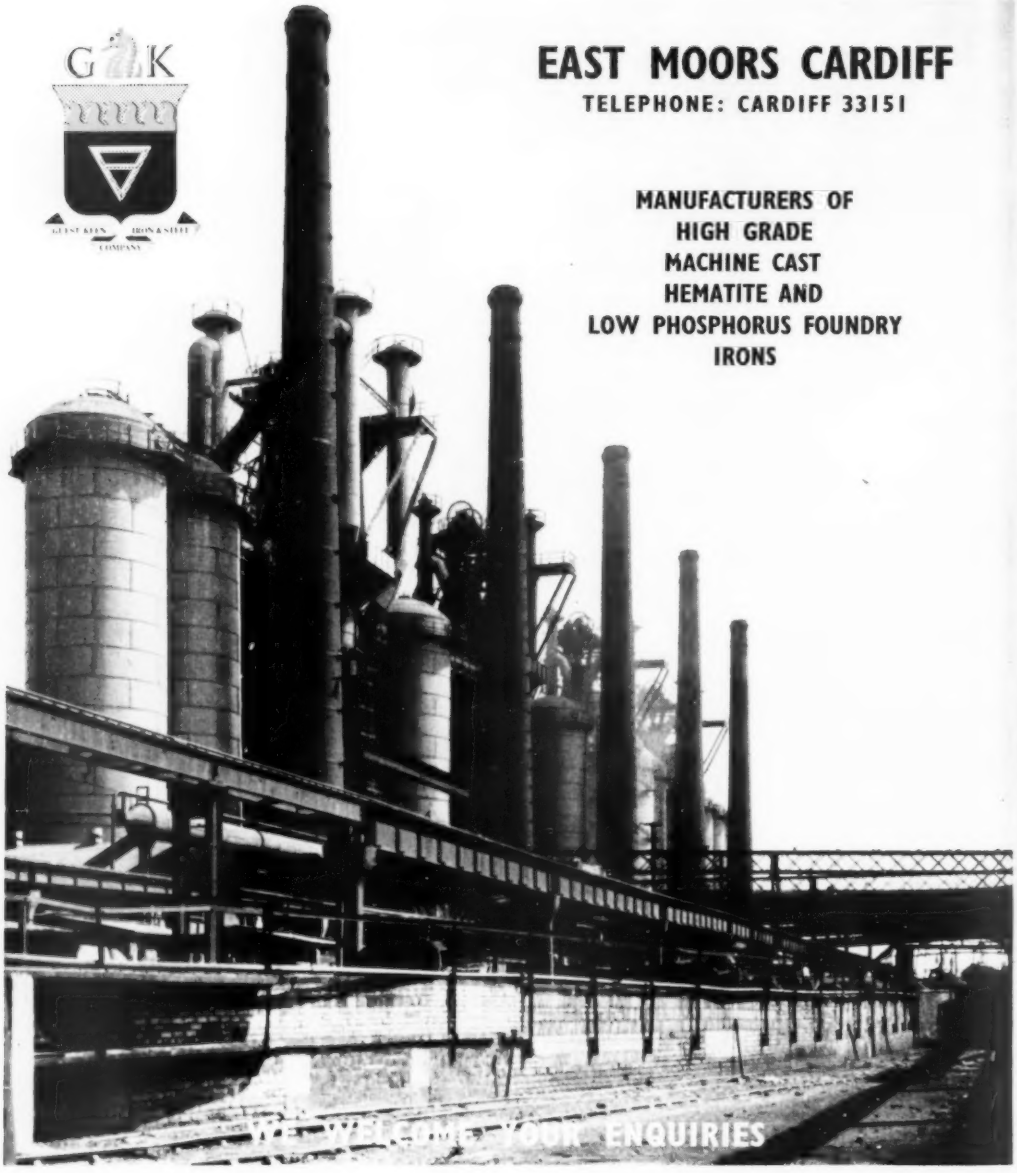

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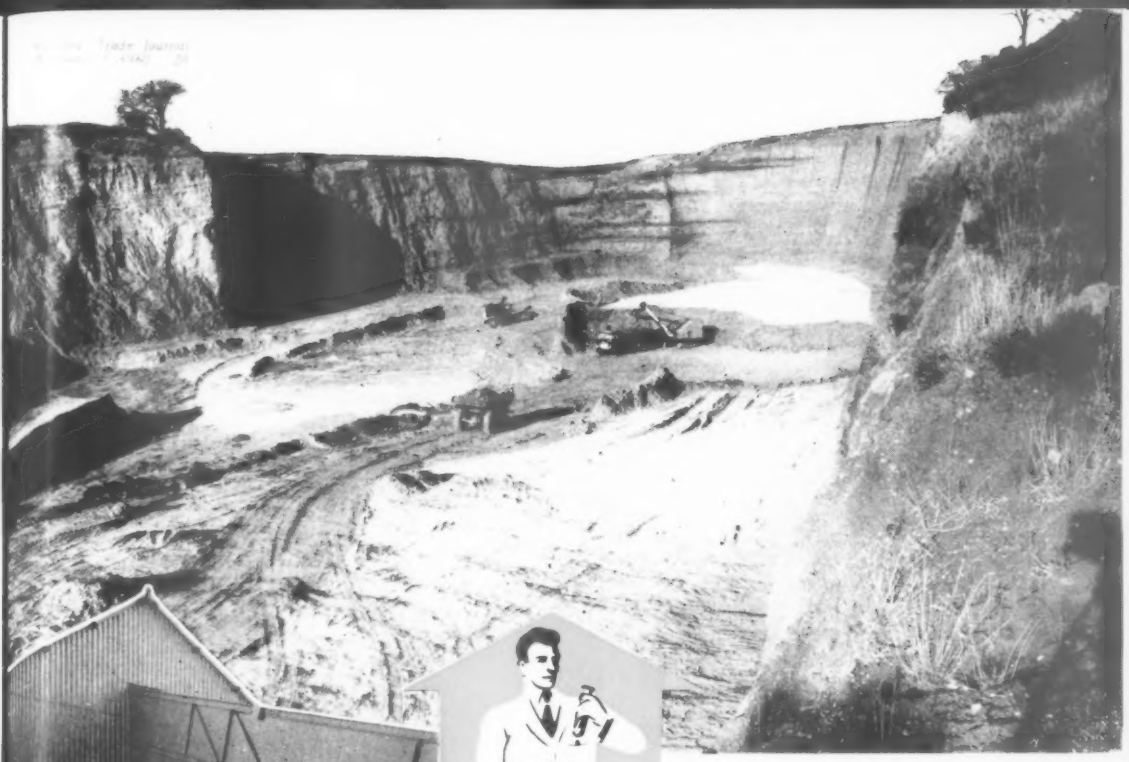

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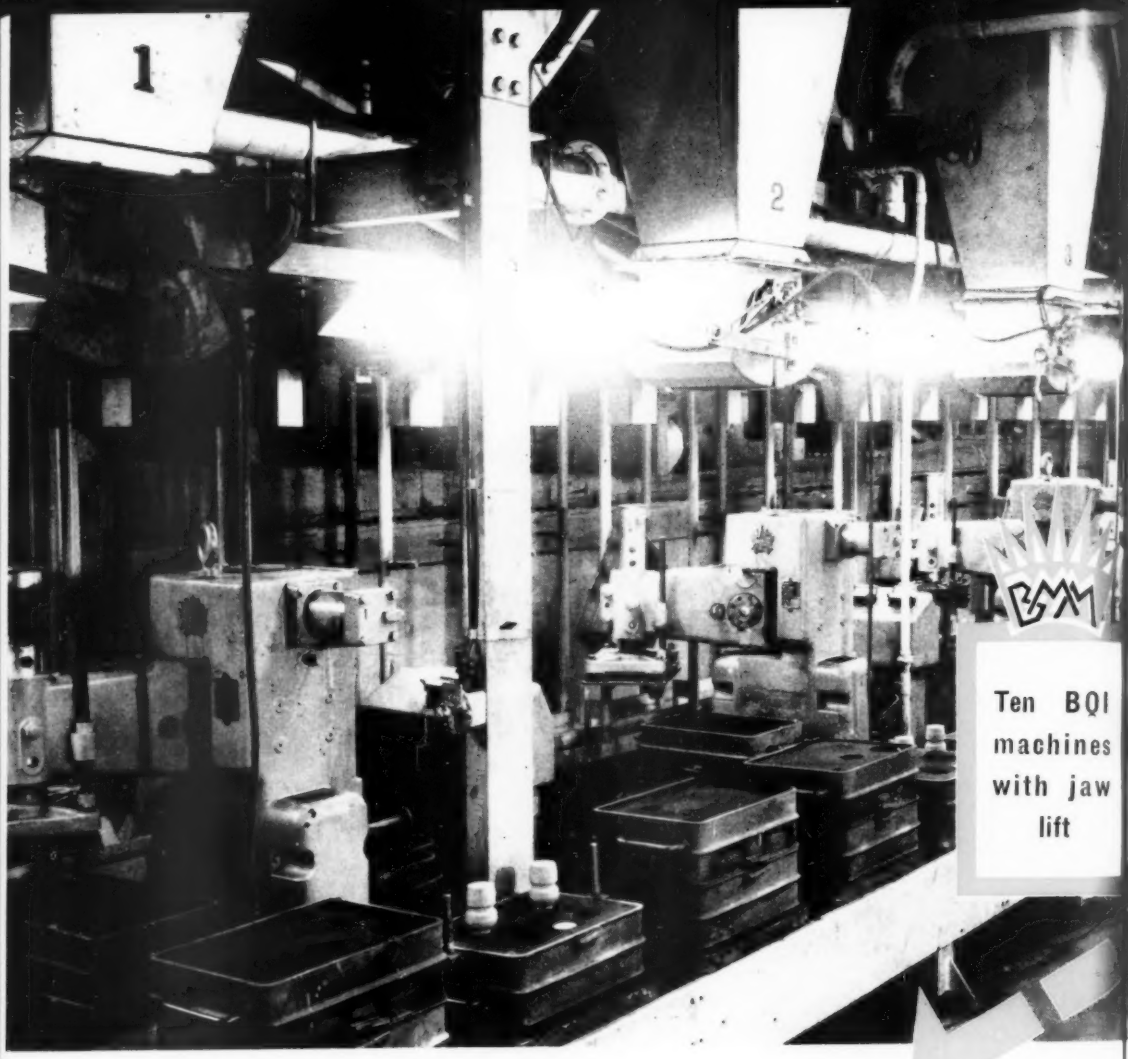

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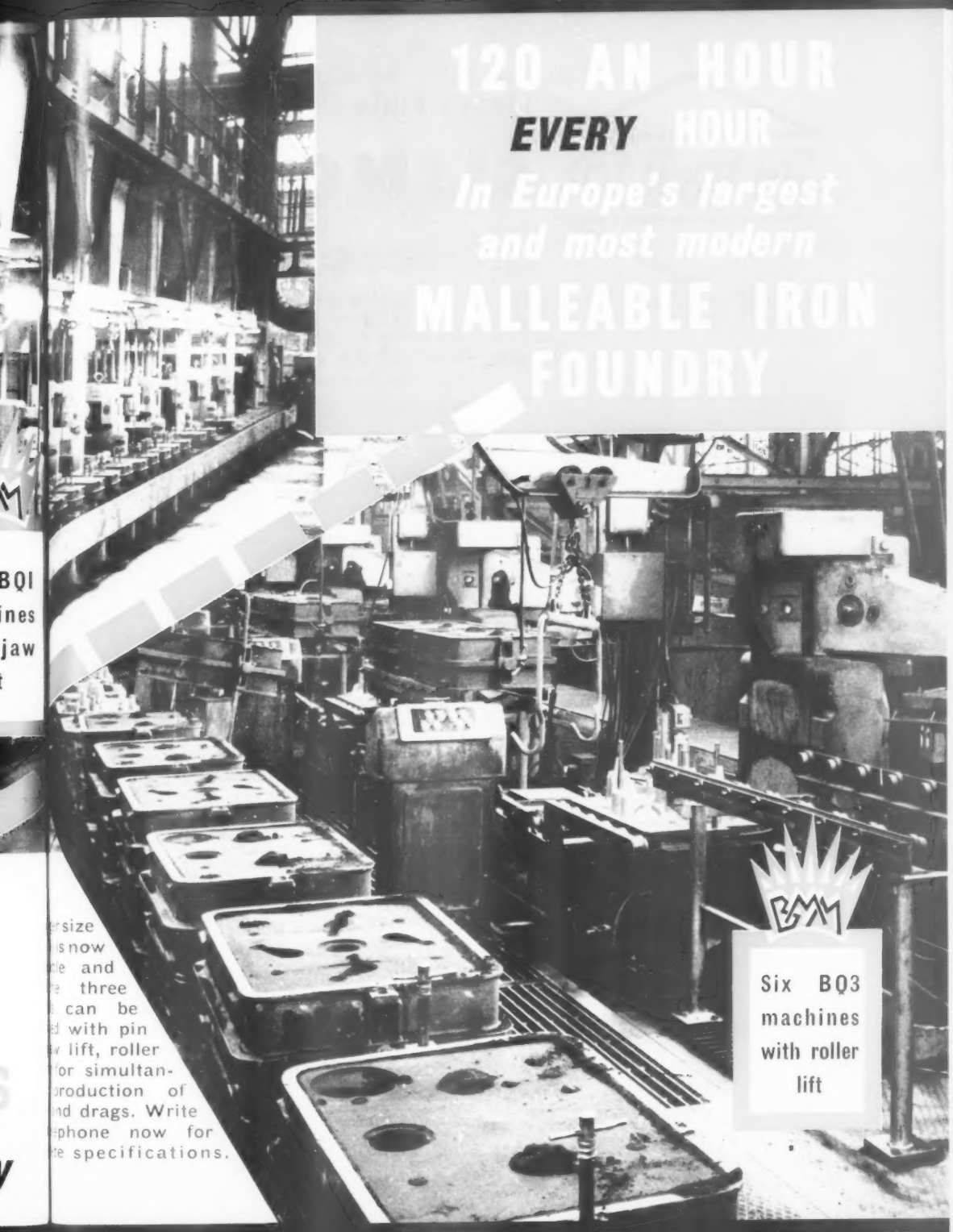

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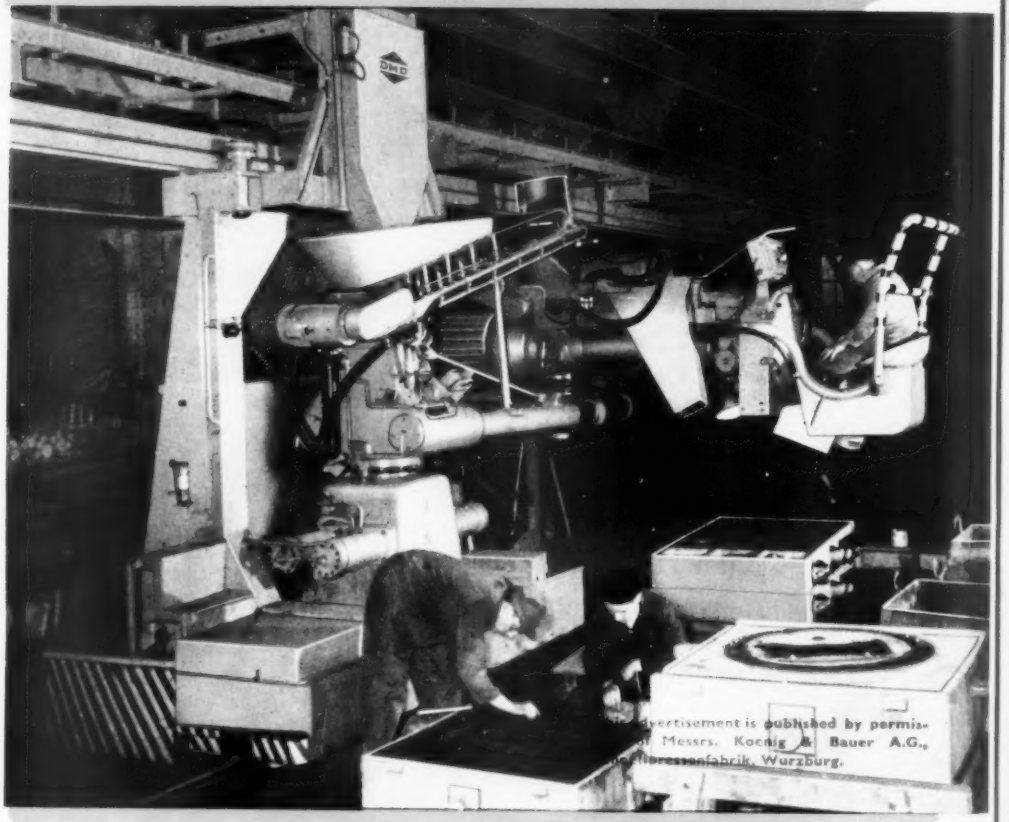

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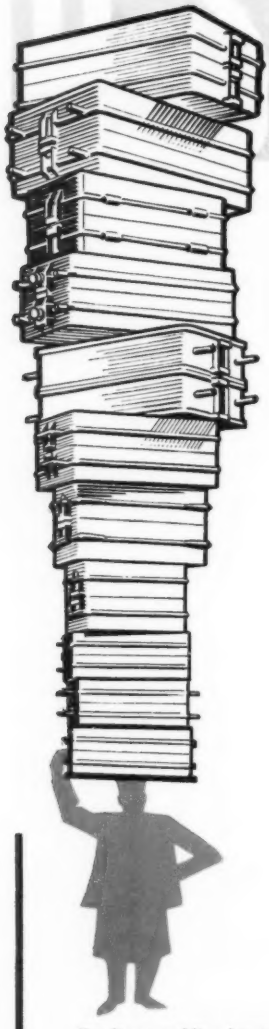

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Vol. 108. February 11, 1960 No. 2253

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FOUNDRY
TRADE JOURNAL

Vol. 108 FEBRUARY 11, 1960 No. 2253

Export Service Bulletin

We have now had an opportunity of examining this tri-weekly publication of the Board of Trade, together with its weekly supplement, which carries excellent market reports from the four quarters of the world. It can be asserted, without reservation, that the new publication is a vast improvement on the previous system. The latter resulted in our receipt, daily or even twice daily, of tightly-packed envelopes containing a great many individual sheets, from which one picked out any contracts of interest to the foundry industry. It was a scheme which wasted both paper and time.

The new publication is set out on a geographical basis, and is divided into two sections—"Calls for Tenders" and "Export Opportunities." Under the first heading, there appeared in the issue dated January 1, only a very few items of direct interest to founders or their suppliers, but such items as a workshop lorry, cranes, fork-trucks, 12-ton tin ingot (presumably, the word "ingot" should be in parentheses), stone-crushers, laundry equipment, textile and printing machinery were listed. A feature of the new *Bulletin* is the printing of the names and addresses of the successful bidders for contracts—information not previously available. In "Export Opportunities," there appeared an enquiry from America for shot suitable for sawing and polishing granite. The writer was unaware of this application for this material, though it may be well known; it is picked out as being the type of information that may have value in widening the range of customers for manufacturers of shot. The weekly supplement to the *Export Service Bulletin* carries, *inter alia*, specialized market reports—typical examples of these are one on the supply of refractories for the Argentine and another on industrial trucks for Belgium. There are other reports, also, of a more general type, such as one covering the non-European market in South Africa, which is a long, illuminating survey of real interest. From past experience of these reports, it can be stated that periodically one does find a paragraph of potential business value to founders, such as the announcement of new works and extensions to existing ones. Years ago, a paragraph in *Iron and Coal Trades Review* to the effect that an American steelworks was extending its heat-treatment section resulted in the sale by the writer of a set of drawings for £600—a lot of money to a small concern, 50 years ago.

The cost of this *Export Service Bulletin* is ten guineas per year. For the larger firms, if intelligently used, it should represent a good investment. As to whether its publication increases competition we cannot tell, but that is one reason why attention might well be focused on those small paragraphs just stating facts about new developments. Those unfamiliar with this service provided by the Board of Trade should write to the Export Service Branch of the Board at Lacon House, Theobalds Road, London, W.C.1, asking to see a specimen copy.

National Foundry Apprentices' Competition

The first stages of the National Foundry Apprentices' Competition, organized by the Institute of British Foundrymen as a qualifying round for the selection of a team of three to represent the UK in the European Foundry Apprentices' Competition to be held in this country in May, are now completed. There were 46 entrants for the competition and, of these, 14 reached a standard in the theoretical section, which included drawing, foundry technology and calculations, comparable with the standard to be expected in the European Competition. Following a practical test, the six competitors listed below were chosen to undergo final tests: K. T. Cawser and C. F. Corbett (both of F. H. Lloyd & Company, Limited); A. Elliott (Darlington Forge, Limited); R. Morley (Bradley & Foster, Limited); W. N. Styles (W. & T. Avery, Limited); and T. J. Vincent (Hamworthy Engineering, Limited).

Of these, the three best competitors will be entered to represent Great Britain in the European contest. The 14 successful competitors in the theoretical section are each being awarded a book prize by the Council of the Institute in recognition of their achievement.

Commonwealth Technical Training

The Duke of Edinburgh, in his capacity as President of the City and Guilds of London Institute, has approved the decision that in the United Kingdom, the date of the Commonwealth Technical Training Week is to be from Monday, May 29, to Sunday, June 4, 1961. The objective of the Week, which it is hoped it will be possible to hold throughout the Commonwealth at approximately the same dates, is to stimulate awareness of the responsibility of the community towards young people entering employment, and to stress the importance of schemes of induction and training. The City and Guilds Institute will be responsible for the central administration in the UK, whilst direct organization will be in the hands of local authorities. A booklet is being prepared to give some guidance as to activities which might be arranged during the Week.

Liverymen's Spring Tour

This year the Liverymen of the Worshipful Company of Founders are to visit Tyneside during the period of May 2 to 5. Sir William Scott has been mainly responsible for the general arrangements which include tours of the shipbuilding yards of Vickers-Armstrongs, Limited: A. Reyrolle & Company's high-voltage testing laboratory, the foundries of Armstrong Whitworth and Jarrow Metal Industries, Limited. On the lighter side, there are to be visits to Alnwick Castle, to Hardy Brothers of Alnwick, a fishing-tackle maker, and the Church of St. Paul at Jarrow which is claimed to be the oldest church in the country.

Mr. JOHN F. PERRY has been appointed chairman of the Fluidrive Engineering Company, Limited, in succession to Mr. HAROLD SINCLAIR who has retired from the board. Mr. Sinclair has decided to retire to concern himself more fully with the work of associated companies in the field of Patents and licensing, principally in Europe and North America. Mr. Perry was formerly managing director of Metropolitan-Vickers Electrical Export Company, Limited, and a director of Associated Electrical Industries (Overseas), Limited.

Forthcoming Events

FEBRUARY 15

Institute of British Foundrymen

East Anglian section: Short paper competition evening for the L. J. Tibbenham award, 7.30 p.m., in the Lecture Hall, Public Library, Ipswich.

FEBRUARY 16

Institute of British Foundrymen

Slough section: "Quality in Pressure-die-casting": A "Brains Trust" with P. Chambers and C. Ralph included on the panel, 7.30 p.m., at the Lecture Theatre, High Duty Alloys, Limited.

FEBRUARY 17

Institute of Fuel

Republic of Ireland group: "Liquid Fuel for High-temperature Furnaces," by A. B. Pritchard and J. A. Taylor, 8 p.m., at the Engineers Hall, 35, Dawson Street, Dublin.

Institution of Plant Engineers

Kent branch: "Fire Protection of Industrial Premises," by F. Wain, 7 p.m., at the Queens Head Hotel, Maidstone.

Institute of Welding

North London branch: "High-pressure Pipelines in the Gas Industry," by F. W. Bell, 7 for 7.30 p.m., at 54, Princes Gate, London, S.W.7.

Institute of British Foundrymen

Stoke-on-Trent section: "A Modern Foundry for the Manufacture of Small Steel Castings by New Moulding Techniques," by A. C. Dennis. Joint meeting with Stoke-on-Trent Association of Engineers, 7 p.m., at the North Stafford Hotel.

FEBRUARY 18

Association of Bronze & Brass Founders

Midland area: Discussion of current matters; in particular the Draft Non-ferrous Foundry Regulations, 11.30 a.m., at the Victoria Hotel, Wolverhampton.

Institute of Vitreous Enamellers

Midland section: "Jewellery Enamelling," by Mr. Ore, 7.30 p.m., at the Station Hotel, Dudley.

Combustion Engineering Association

Northern region: Discussion of the "Workings of the Clean Air Act," 2.30 p.m., at the George Hotel, St. George's Square, Huddersfield.

FEBRUARY 19

Institute of British Foundrymen

Bristol and West of England branch: "A Further Study of Casting Defects and their Possible Cures," by J. L. Francis, 7.30 p.m., at Swindon.

Stoke-on-Trent section: Dinner/dance (details from secretary).

Latest Foundry Statistics

Light Alloys: In international circles, this country has a high reputation for the prompt publication of foundry production statistics, but those issued by the Ministry of Aviation do not enter into this category. The October figures, which have only just been issued, show that during this month aluminium-alloy castings made from sand moulds weighed 1,765 tons; those made as gravity-die-castings totalled 4,899 tons, whilst the pressure-die-castings production was returned at 1,906 tons. These figures reveal that the October production was higher than that for the year's monthly average. The output of magnesium castings, however, at 139 tons was lower than the monthly average of 152 tons.

SUPPLY OF a "substantial quantity" of avometers to Communist China is being negotiated by Avo, Limited, London, S.W.1, a company in the Metal Industries group. The contract is nearing completion. Avo is to take part in an exhibition in Moscow in June organized by the Scientific Instrument Manufacturers' Association.

Interfacial Tension and Surface Finish of Sand Castings

By J. F. Kayser, F.I.M., Assoc. Met.

The foundry industry is a very old one and for centuries it made little, if any, technical progress. During the author's lifetime, however, enormous progress has been made and appears to be continuing at an ever increasing rate. It is hence desirable that foundrymen be acquainted with all known phenomena that may be applicable to the compaction or bonding of sand, and the behaviour of molten metals and related subjects. One such is dilatancy, a phenomenon described by the author in a previous contribution,* and which was first observed nearly a century ago. It is well known to some industries but appears to have escaped the notice of others. This present contribution is devoted to another phenomenon that is without doubt of paramount importance in the foundry, namely, interfacial tension.

The surface properties of molten metals and of sand moulds vary considerably, and in its first report[1] on "Surface Finishing for Non-ferrous Castings," sub-committee T.S.48 of the Technical Council of the Institute of British Foundrymen referred to the part played by the surface tension of a molten metal in determining the extent to which it penetrates a sand surface, but did not refer to the surface properties of the sand or to the presence of a third phase. Udin[2] had, however, already called attention to the fact that although one usually thinks of a surface as a limiting plane of a phase, a surface is always a boundary plane between two phases. However rarified one of the phases may be, its properties must be considered in any thermodynamic treatment of the surface, and if this fact is ignored serious errors may be made. It is, therefore, preferable to reserve the terms "surface tension" and "surface energy" for the case of a solid or liquid in equilibrium with its vapour, or with its vapour mixed with a noble gas. All other cases are examples of interfacial tension or energy.

A solid is held together by molecular forces of attraction, and a liquid is similarly held together in drops. Unlike molecules attract each other, as do like molecules, and in some cases the attraction between unlike molecules is greater than the attraction between like molecules, and *vice versa*. Water, for instance, has a greater attraction for glass than for water, and hence when a glass rod is drawn out of water into air it come out wet. If, however, a glass rod is drawn out of mercury into air it comes out dry, because the attraction of mercury for mercury is greater than the attraction of mercury for glass. The attraction between like molecules is called cohesion; that between unlike molecules is called adhesion.

Wetting

When a drop of liquid is placed on a horizontal solid surface it may spread indefinitely and wet the surface perfectly. It may, however, spread to a limited extent and come to rest, so that the surface of the edge of the drop meets the surface upon which it rests at a definite angle called the contact angle; wetting is then said to be imperfect. Partial surface equilibrium for the case of imperfect wetting is shown in Fig. 1, where AB is a very small portion of a surface, say of a particle of sand, and M is a drop of liquid, say a drop of liquid metal so small that the effect of gravity may be ignored.

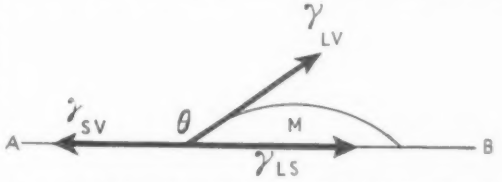

FIG. 1.—*Diagram illustrating partial surface equilibrium in a case of imperfect wetting. AB is a very small portion of the surface of a particle of sand, and M is a drop of liquid metal which is so small that the effect of gravity upon it may be ignored.*

In this case:

γ_{sv} is the interfacial tension at the sand surface/vapour interface;

γ_{lv} is the interfacial tension at the liquid metal/vapour interface;

γ_{ls} is the interfacial tension at the liquid metal/sand surface interface, and 180 deg.—θ is the contact angle of the liquid metal.

Then the equilibrium of forces requires:

$$\gamma_{sv} - \gamma_{ls} + \gamma_{lv} \cos \theta = 0$$

The more nearly the contact angle approaches zero the further and the more readily will the liquid spread over the sand surface, and for perfect wetting θ bcomes 180 deg. (*i.e.*, the contact angle is 0 deg.) when

$$\gamma_{sv} \geqq \gamma_{ls} + \gamma_{lv}$$

* See JOURNAL, January 29, 1959, p. 121

Interfacial Tension and Surface Finish

Penetration of Voids

If the molten metal wets the surface of the sand particles perfectly it will spread over it and, if it remains sufficiently fluid, will penetrate into the voids between adjacent particles without the aid of, and sometimes even against a head of molten metal. If, however, the wetting is imperfect the molten metal will not continue to spread indefinitely without the aid of a head of metal, and so will not penetrate into small voids. An example of this is provided by the porous nickel caps used in the safety switch in proximity fuses; C. S. Smith points out that although the mercury in these will not penetrate the relatively large pores of the nickel compact under ordinary conditions, the extra pressure provided by centrifugal force on firing the shell causes it to do so.

The skill of a moulder consists, *inter alia*, of making sand moulds with a permeability which will give the best possible casting. If a high permeability is required, the voids are necessarily correspondingly large and favour metal penetration. Fortunately, however, the surface properties of sand- and molten-metal surfaces are to some extent controllable, but it must be remembered that a surface is not a simple boundary between two phases (say between liquid metal and its environment), and the internal structure and properties of a phase do not persist unchanged up to the ultimate atomic demarcation. The surfaces of liquid metals and alloys absorb and/or react with the atmosphere, and all high-melting-point metals and alloys have a significant action upon moulding sands.

Metal-pouring Atmosphere

The atmosphere in which a metal is cast can be readily altered. Usually metals are cast in air, which on occasion may be saturated with water-vapour. It is quite easy to cast in hydrogen, sulphur dioxide or other gas, and with a little more difficulty one may cast in a reduced atmospheric pressure. It has been suggested that metal penetration may be prevented or reduced by the setting up of a gas pressure, as, for instance, when metal heats an organic binder incorporated in the sand mix. Such a gas might, however, achieve the same result by increasing the interfacial tension at one or both of the phase interfaces.

Alteration of Surface Properties

It is well known that the surface properties of a solid can be easily altered. Specification DTD 644 describes an anti-spreading compound which, when applied to a surface, significantly increases the contact angle of lubricating oils that may be placed upon it (the surface). If one submits a solid surface, be it glass or metal, to a brush discharge at atmospheric pressure, the opposite effect is obtained, *i.e.*, the contact angle of a liquid placed upon it is lowered. Similarly, the wettability of a mould surface depends upon the type of sand and upon the bond with which it is coated, particularly upon the latter.

The surface properties of molten metals vary considerably, and can be also easily altered. Additions of silicon or manganese or aluminium have a profound effect upon the surface properties of liquid nickel/chromium and nickel-chromium/iron alloys; silicon and manganese increase the contact angle, whilst aluminium lessens it. A difficult metal to cast is the one corresponding to the formula NiA1; it must be cast at about 1,800 deg. C., it wets all types of silica sands. and it penetrates to such an extent that it is difficult to distinguish a line of demarcation between the solidified metal and the sand. A high carbon-chromium alloy cast at 1,800 deg. C. does not, however, penetrate into most sands, and clean surfaces are readily obtained.

Experience with Pure Metals

The statement that molten metals do not wet silica is not always true, and if it were true it is doubtful if it would have any practical significance. The author has never cast pure metals into a silica mould, but he has experimented extensively with many different alloys melted, and has cast in air, in hydrogen and under a reduced pressure. A few of the alloys wetted all available sands and penetrated into them to a considerable extent. He has, however, obtained clean castings from many different alloys by a suitable choice of moulding sand and/or surface treatment of the finished mould, but has never found a sand mould that behaved the same way with all the metals and alloys with which he worked.

Casting temperature and the height of the head of molten metal play a big part in determining the extent to which a metal penetrates into a given sand mould. The higher the casting temperature and the head of molten metal, the greater the depth of penetration. Penetration does not, however, depend only upon the height of the head of metal. If adhesion is greater than cohesion, liquid metal is sucked into a porous surface against the force of gravity. An instance of this is the ease with which iron is absorbed by a porous mass of tungsten carbide or molybdenum carbide.

Conclusion

The foundry technologist has endless opportunities to effect surface improvements, because the surface properties of solids and liquids can be easily changed. Indeed the more difficult task is to produce any solid or liquid with the same surface properties, or any other properties, every day of the year. Alteration of the surface properties of the molten metal is often dangerous in that it may well go hand in hand with a significant change of the bulk properties of the resulting casting. It is, however, improbable that the bulk properties of a casting will be affected by changes of the moulding material or any material with which the surface of the mould may be treated, and there is hence ample scope for anyone to seek to improve the surface finish of castings by changing the bond or by treating the surface of the mould.

REFERENCES

[1] *British Foundryman*, **51**, 1958.

[2] Metal Interfaces—Measurement of Solid: Gas and Solid: Liquid Interfacial Energies, page 115.

Cast Cannon— the 15th to 19th Centuries

By P. J. Browne

For over four hundred years, cast cannon had an important part to play in the disputes between nations. During this period, Britain grew to be one of the foremost nations of the world, possibly due to some extent to the efficiency of her cannon, and hence also to the efficiency of her founders. It might be said that the production of cannon taught foundrymen certain fundamental principles, *e.g.*, the need for accuracy and cleanliness in melting and casting. The principles involved are not the property of any one nation; indeed, most of the authorities quoted in what follows are foreign. English founders appear to have been shy of the written word—perhaps finding it more lucrative to get on with producing cannon, rather than spend time writing about the job!

It appears that the forerunner of the modern patternmaker had a very humble rôle in the production of cannon, as the universal method of producing the pattern in the old days was by loam moulding—all that was required in the way of pattern equipment being strickle boards. It is perhaps difficult to realize that wooden patterns were not used. However, man was a potter before he was a founder, and the working of clay required very little mechanical effort, whilst the difficulties of turning large quantities of timber in the 15th century would have been very formidable. Once the principles of production had been established, they remained almost constant until the cast muzzle-loading cannon became extinct, in the 19th century.

Early Production Methods

The earliest cannon were produced by one of two methods: (*a*) by means of wrought-iron strips welded around a mandrel, and (*b*) by casting bronze into a dried loam mould. The manufacture of cast-iron cannon came at a later date. From a manuscript written by Kritoboulos[1], in 1467, it is learned that whilst Muhammad II was besieging Constantinople in 1451: "He summoned the makers of his ordinance and discoursed with them on the guns, and what manner of cannon he needed the better to batter down the walls." One of Muhammad's guns, cast in 1464, still stands in the Tower of London. This gun consists of two parts, the barrel, and the chamber. These are connected together by means of a cast thread. The complete piece is 17 ft. 2 in. long, the bore dia. being 25 in. The greatest external diameter is 47½ in., and there is 13 in. of screw thread with a root dia. of 19 in.

Moulding

Kritoboulos describes part of the manufacture of the mould in the following way:

> "They take a quantity of very fat clay, the purest and lightest possible, which they make plastic by kneading it for several days. The mass is knit together and prevented from breaking by the intermixture of linen, hemp and other shreds, and the whole worked up and well mixed in such a manner as to make one tough and compact mass. Then they make a round cylinder in the form of a flute, very long, to be the mandrel or core of the shape. Another exterior to receive the first is next made, hollow as if intended for a sheath to the first but, be it observed, larger and not alone to receive the other, but such as to leave a void space between the two. This space or the interval all round between the surfaces, which are uniform, is intended to receive the bronze pouring into it from the furnace to take the form of the cannon. The exterior is made of the same description of clay, but entirely surrounded and fortified with iron, timber, earth and stones, built up round to prevent the immense weight of bronze from fracturing it."

It appears that the core was swept up—whether the mould was swept up, or a loam pattern produced and a ramming taken from this, is not clear, but the author considers the latter to be most likely.

Accurate Screw Thread

The screw thread connecting the two parts of the cannon is the outstanding part of this piece. When this thread was unscrewed in the 19th century[2], it was found that a force of nearly 40 tons was required for this purpose. On examination of the thread, there was no appearance of any tool work—in any case, a tool could only have smoothed away minor imperfections of surface, and could not have altered the distance of the pitch of the threads, upon which the fit depends[3]. It has been suggested that a wooden pattern of this thread was first cut, and then a mould taken from this. The writer considers this to be unlikely, however, since, being obviously highly proficient in the use of loam, the founders would have been more inclined to produce this thread in loam rather than a medium such as wood. He points out that, even with modern techniques, it is still quite difficult to

produce an accurate male and female thread in wood. On the other hand, the use of a strickle board the shape of the teeth, and a primitive cam to give the pitch of the thread, would give an accurate, easily produced loam mould. Indeed, this method is still used to-day for producing helical threads on castings. What does perhaps seem surprising is the efficiency with which these early founders worked clay to produce castings capable of withstanding the tremendous stresses set up when a cannon was fired. Kritoboulos states that a feeder-head of 1 pic (27.9 in.) was used. It seems that this gun was cast breech-end up, with a feeder-head off this, this head being probably hewn off with axes while the metal was still hot.

Turkish Founders

It is interesting to note here that three hundred years later, in 1750, a Baron de Trott[4], went to Turkey and made the following observations in his memoirs:

> "All the work was done in common furnaces and the bronze burnt by the action of bellows, and then cooled at the bottom of the basin, reaching the moulds in a state of paste, this adding to the imperfections of the piece produced. I proposed to establish a reverberatory furnace and a boring machine. The idea of casting without bellows, and of casting solid and boring out provoked the laugher of the Turkish founders."

Thus, although these founders must have been at one time in the forefront of their craft, they had apparently progressed little in 300 years.

Solid Breeches

Until the 17th century it was the practice to core out the bore diameter, this cast bore then being cleaned with hand tools. The difficulty of producing such a core, and accurately positioning it in the mould to give a clean and true bore, will be appreciated. The 16th century saw the introduction of cast-iron guns with solid breeches. The trend was encouraged by (*a*) the fact that iron cost much less than bronze, and (*b*) the increasing efficiency of ironfounders, who were now also making cannonballs. The first iron cannon made in England appears to have been produced in 1509, probably by French founders who came to England to establish their industry.

Mould Drying

With the passing of time, methods become standardized. Deuis[5], in his *Encyclopedie* written in 1751, illustrates the methods of producing cannon. He shows quite clearly the pattern for the piece being struck up on a loam lathe. The mould is shown being dried by means of a fire. The necessity to dry moulds appears to have been realized from very early days. Gaya[6], writing in 1678, states that: "The moulds and cores should be well greased with tallow, bound and secured with iron, well baked and re-baked." There are records of serious explosions causing death and injury, due to under-dried gun moulds. Kritoboulos does not mention the drying of the moulds, but it is possible that the moulds may have been merely left in the hot Asiatic sun.

Casting Methods

The methods of casting cannon appear to have remained constant throughout the ages. Right from the start, gun moulds have been placed muzzle upwards in a pit, with a feeder-head on top, the metal being poured into the open top of the mould. As Gaya said: "The foundrymen must take special care in the heating and mixing of the metals as well as with the cleanliness of the bores of the cannon." As already mentioned, from the 17th century cannon were cast solid, the bores being hollowed out afterwards—this procedure ensured an accurate and clean bore. As will be readily appreciated, some of the smaller pieces, with 3-in. dia. bores and a length of 5 to 6 ft., would be very difficult to cast with a clean bore. It was therefore less difficult to produce large cannon than small ones. Some of the last cast-iron muzzle-loaders produced in America were made by means of the "Rodeman" system, in which a water-cooled chill was employed to produce the bore and thereby give compressive stresses at the barrel.

Chemical Composition

It is interesting to compare chemical compositions used at different periods. Samples taken from Muhammad's gun[7] were found to vary considerably, from Cu 89.58, Sn 10.15 per cent., to as high as Cu 95.2 per cent. in a specimen taken from the muzzle. The alloy was also found to vary greatly in hardness. Gaya offered the following advice: "In casting pieces of cannon you generally add 20 lb. of bell metal to a 100 lb. of pure copper. If you are short of bell metal you obtain some soft tin. In which case you add 10 lb. of soft tin to 100 lb. of copper, or even 10 lb. of brass and 8 lb. of soft tin. Also, since pieces cannot be cast without some loss, you put in 1 lb. extra for each 6 lb. of metal."

Whether this last piece of advice was meant to include all metal losses (oxidation, runners, risers, etc.) is difficult to say, but if this was the ratio between metal charged and finished casting weight, it was quite reasonable.

Cannonballs

A mention must be made of cannonballs, or as they were originally known, "gun stones"—this was in fact what the first ones actually were, blocks of granite fashioned into a ball. It is not known who first used cast-iron cannonballs, but it was soon realized that this was a cheap, effective and accurate method of producing ammunition. The chemical composition of an iron cannonball[8] found at Litchfield, and believed to have been cast around 1650, is as follows: Total C 3.2 (graphite 2.76, combined C 0.44); Si 0.8; Mn 0.48; S 0.056, and P 1.12 per cent. This ball appears to have been made in a

sand mould, and it is clear from its dimensions that it was made to a tolerance of ±.025 in., which even by present-day standards must be considered good. Deuis' *Encyclopedie* has illustrations showing cannonballs being produced from metal dies. The dies appear to have been machined, and dowells are provided for location purposes.

Science takes a Hand

The 19th century saw science take a hand in the production of cannon. Cast irons of carefully controlled chemical composition, possessing high tensile strengths, began to be used. Rodeman, an American, experimented with a water-cooled chill for the cannon bore, and controlled the metal cooling rate, with good results. With the coming of the 20th century, however, the cast muzzle-loader, after having reigned supreme for 400 years, made way for modern artillery. It is to be hoped that, apart from providing a means for dealing death and destruction, the production of cannon has given founders knowledge and experience which has been used for better purposes.

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[1] Kritoboulos' manuscript, dated 1467, translated by Dr. Detier, *Archeological Journal*, **25**.
[2] Extracts from the log of H.M.S. Terrible.
[3] *Archeological Journal*, **25** (1868), 277.
[4] De Trott's Memoires, **3**, 1790.
[5] Diderot Deuis' *Encyclopedie*, **5**, 1751-1780.
[6] *Trite des armes*, by Gaya, 1678.
[7] *Chemical News*, September, 1868.
[8] IBF *Proceedings*, **42**, Paper 946. FOUNDRY TRADE JOURNAL, September 1, 1949, **87**, 261.

Book Review

Fifth National Symposium on Vacuum Technology, Transactions. Edited by Wilfrid G. Matheson, sponsored by the American Vacuum Society and published by the Pergamon Press, Limited, 4 & 5, Fitzroy Square, London, W.1; price £5.

Vacuum techniques have advanced so much in recent years, and now play such an important part in all branches of science and industry, that the American Vacuum Society regularly organizes symposia on the subject. The 50-odd papers that were presented to the fifth of these symposia, held in late 1958, make up the volume under review. All of them have one thing in common—each describes a piece of scientific work or an industrial process that would not have been possible without modern vacuum techniques. The papers cover a very wide field of activity and few apart from vacuum engineers are likely to be interested in all of them. For metallurgists, even those without direct interest in vacuum technology, there are many chapters that make fascinating reading.

The electron bombardment furnace has been known on a small scale for many years, and its use for melting buttons of refractory metals need occasion no surprise. The same cannot be said, however, of the scaling-up of the electron furnace to make ingots up to six inches in diameter and weighing up to 200 lb. The paper that describes in detail the apparatus and procedure for this large-scale use of the technique also shows that with metals such as niobium, tantalum, tungsten and molybdenum, purification accompanies the melting process because such a high degree of vacuum is necessary to maintain the electron beam.

The use of high-vacuum techniques may seem far removed from foundry practice, but skull melting and casting *in vacuo* have already been applied to the production of titanium and zirconium shapes. Readers of this JOURNAL will therefore be specially interested in the article on "Skull Furnace Design and Application" which deals systematically with the various features that must be controlled if success is to be achieved. Although the technique has been developed primarily for refractory and reactive metals that cannot be cast in the normal way, it also shows promise for the production of castings in alloys destined for service at high-temperature. This is largely because of the extra cleanliness and lower gas-contents that result from arc melting in a high vacuum.

A number of the contributions describe vacuum furnaces of one kind or another. Temperatures of up to 2,600 deg. C. may be obtained by the use of tungsten elements and metallic radiation shields. Rapid heating and cooling rates are then possible, making the furnace specially suitable for sintering refractory metals. Heat-treatment in high vacuum became economically worthwhile a few years ago, when it was found possible to reclaim titanium aircraft components that had been rejected because of high hydrogen contents. Suitable heat-treatment cycles in vacuum removed the hydrogen and made the titanium acceptable. Vacuum heat-treatment has other advantages besides degassing, for example, in certain alloys correction of mechanical properties may be possible even after components have been finish-machined to fine tolerances. The use of vacuum rather than a hydrogen atmosphere during brazing limits the brazing metals that can be employed, but increases the probability of producing really sound joints.

Various aspects of the degassing of molten metals in vacuum are considered in three papers. Two of them are concerned with Russian views on the mechanism of gas-removal and with results obtained on Bessemer steel, and the third gives a good, though somewhat brief review of American practice and experience. Notable among the advantages of vacuum degassing of molten steel is the reduction of hydrogen to such low levels that hair-line crack formation is prevented. The results presented in the article "Vacuum-stream Degassing reaches Commercial Acceptance" would seem to justify the title and to suggest wider use of the process.

Space is too short to mention some of the smaller-scale metallurgical applications of vacuum technology that are discussed in this volume. All those concerned with any of the topics already mentioned will find much to interest them in these *Transactions* and, in addition, if they find time to glance through the other chapters they are likely to make themselves more aware of the directions in which vacuum technology is developing. Only a few years ago, several of the applications now discussed would have seemed quite impossible and who knows what the future will bring? Perhaps the title of the final article provides a clue: it is "High-vacuum Technology in a Space-research Laboratory."

A. G. QUARRELL.

Mr. A. BEARD, formerly chief production engineer of Simmonds Aerocessories, Limited, Mr. W. J. BURNELL, chief mechanical engineer, Mr. S. H. GOSS, general sales manager, Mr. A. P. H. PEHRSON, export manager, and Mr. C. J. WILLIAMS, works manager, have been appointed to the board of the company. All have previously been executive directors. Mr. Goss and Mr. Williams have also been appointed assistant managing directors. Simmonds Aerocessories is a member of the Firth Cleveland group.

Company News

PEASE & PARTNERS, LIMITED, foundrymen, of Darlington (in voluntary liquidation)—A first capital return of 4d. per 1s. share, payable about February 13, is announced.

GENERAL ELECTRIC COMPANY, LIMITED—Provisional results for the first eight months' trading and estimated figures for the rest of the current year ending March 31, 1960, indicate an increase in both turnover and profit earnings. The interim dividend is maintained at 3 per cent.

S. RUSSELL & SONS, LIMITED, ironfounders, of Leicester—A one-for-one scrip issue to holders of February 1 is announced. Current year profits are expected to be up on last year. Prospective final dividend for the year to March 31, 1960, is "not less than 7½ per cent." on the increased capital.

WESTINGHOUSE BRAKE & SIGNAL COMPANY, LIMITED—Confidence that the group will achieve good results for the current year is expressed by the chairman, Mr. A. R. S. Nutting. He warns, however, that they may not be quite so good as the record profit figures returned for the 53 weeks ended October 3, 1959.

HADFIELDS, LIMITED—Group profits, including £112,500 in respect of the previous year, fell to £486,536 (£609,005) in the year ended October 3, 1950. Tax was substantially lower at £301,453 (£425,357) and there is an available net balance of £302,575 (£200,783). The dividend is held at 6 per cent. with a final of 4 per cent., following a 3 per cent. cut in the rate last year.

COVENTRY GAUGE & TOOL COMPANY, LIMITED—Experience of the first four months of the current year shows a much improved order position with a generally brighter industrial outlook for capital goods, states the chairman, Sir Stanley J. Harley. However, it may well be some time before the benefits of all the steps taken in the year become fully effective and apparent in the results.

HARPER ENGINEERING & ELECTRONICS, LIMITED—Contracts have been exchanged for the purchase of all the £50,000 ordinary capital of B. O. Morris (Holdings), Limited, makers of flexible-shaft grinding machinery, etc., of Coventry, in exchange for 1,150,000 Harper 1s. shares, subject to permission to deal. It is understood that the deal is worth over £680,000. Mr. E. M. Morris, chairman of B. O. Morris, will join the Harper board.

J. BROCKHOUSE & COMPANY, LIMITED, founders, dropforgers, makers of laminated axles, road springs, etc., of West Bromwich—Agreement has been reached between the boards of the company and Albion Drop Forgings Company, Limited, Coventry, with a view to the complete integration of Albion into the Brockhouse group. The latter already owns 145,290 5s. ordinary shares in Albion and will make an offer to acquire the remaining 574,710 shares on the basis of one Brockhouse ordinary £1 share for every two Albion ordinary.

JOHN HARPER & COMPANY, LIMITED, general ironfounders and oil- and gas-appliance manufacturers, of Willenhall (Staffs)—Application is being made for a quotation on the London Stock Exchange. The shares have been quoted in Birmingham for many years. Issued capital consists of 150,000 4½ per cent. £1 redeemable preference shares and £1,012,500 in 5s. ordinary. Dividend on the ordinary has been a steady 10 per cent. interim plus a 20 per cent. final followed last time by a 200 per cent. scrip issue. The interim for the current year to March 31, 1960, was 4 per cent.

AVERY'S, LIMITED, weighing-machine manufacturers, and founders—A tax-free distribution of 11d. per £1 unit absorbing £187,919 of capital reserve is to be made. The directors state that this distribution will not be taken into account when determining the final dividend for the year ending March 31, 1960. It is pointed out that the company owned shares in Midland Employers' Mutual Assurance and that a share exchange offer from Eagle Star Insurance for MEMA shares was accepted last July. The Eagle Star shares have now been sold, realizing about £190,000, which is surplus to requirements.

WEARDALE LEAD COMPANY, LIMITED—Since September home orders of metallurgical grade fluorspar have considerably improved and the chairman, Col. H. Haswell Peile, is reasonably confident that the company will revert to its former level of metallurgical grade sales this year. The entry of other producers has resulted in refined fluorspar general price reductions. The board is actively engaged in this problem. Substantial mineral reserves exist and particularly since September the metallurgical market has improved. Net profit for the year ended September 30 last was £4,513, compared with a loss of £2,540 for the previous year, and the dividend was 7½ per cent. (nil).

NEEPSEND STEEL & TOOL CORPORATION, LIMITED—The company is maintaining its interim at 12½ per cent. on capital increased by a one-for-four scrip issue. This represents an effective rise of 2½ per cent. Previous year's final of 37½ per cent. is equivalent to 30 per cent. on the present capital. The president, Sir Stuart C. Goodwin, says it is too early to assess trading results for the year ending March 31, 1960. He refers to a serious recession in the early part of the period, but adds that conditions have changed considerably in recent months and that the directors are hopeful that results will be comparable with those of previous years. An extra-ordinary meeting is to be held on March 31 to increase the permitted number of directors from seven to nine.

CASTINGS, LIMITED—The company is applying to the committee of the Stock Exchange, Birmingham, for permission to deal in, and for quotation for, 2,000,000 ordinary 2s. shares, the whole of the issued share capital of the company. The placing price is 3s. 1½d. The directors expect profits for the current year ending March 31, to be in excess of £75,000, subject only to tax. A final dividend of 5 per cent. is foreshadowed, making 12½ per cent. for the year. The only changes in the organization so far announced are the retirement from full-time directorship of Mr. W. D. Bullows at the end of March. He will continue to serve as part-time consultant for 11 years. From 1933 until February 1 this year, Mr. Bullows was chairman and managing director of the company. On February 1, Mr. H. G. Hall and Mr. W. H. Cockerill became joint managing directors with Mr. J. F. Cooke as chairman. (The company's new foundry at Brownhills was described *in extenso* in the JOURNAL of July 24, 1958, and it is now announced that the directors are considering plans for a further extension to utilize the surplus melting capacity which is available at this foundry. The site is sufficient to accommodate an office block, research laboratories and two further bays of equal size to the existing foundry).

SUPERHEATER COMPANY, LIMITED—Mr. Eric A. Robinson, chairman and joint managing director, who retired from the position of joint managing director in January will remain chairman of the company. Mr. L. C. Southcott, joint managing director, becomes managing director.

Lee, Howl's New Dressing-shop

The dressing shop of Lee, Howl & Company, Limited, which served the company's iron and non-ferrous foundries, had become outdated. What follows is a description of the new shop and some of the equipment which has been installed.

A new dressing-shop, 60 ft. long by 30 ft. wide, has been installed to serve the foundries of Lee, Howl & Company, Limited, at Tipton. It is situated adjacent to the iron foundry and houses new, as well as certain existing, plant and equipment. The shop (Fig. 1) is designed to handle some 1,200 tons of castings per year, ranging from a few ounces to three tons individual weight. In the main, the castings are the various pump parts and accessories manufactured by the company, and the variety of the castings produced can be gauged by the fact that the range of pumps made covers the small hand-variety to those requiring prime movers of 350 h.p.

Equipment installed

One of the major items of new plant installed in the new shop is a Spencer & Halstead shotblasting room (Fig. 2), measuring 15 by 10 by 8 ft. high. This plant is equipped with a magnetic separator under the floor, so that if required de-coring can take place inside. The shotblasting enclosure is fitted with a special glass roof, and has rubber-lined walls to reduce noise and plate wear. The larger-size castings are brought from the iron foundry on a bogey which is mounted on rails which terminate in the cabinet, and heavy castings are handled by a 3-ton overhead-runway chain hoist. Dust-extraction equipment (by Dallow Lambert) is installed to serve this plant.

Next to the shotblasting cabinet is a new Centriblast rumbling barrel, also made by Spencer & Halstead, and this is used for the smaller size of castings produced. The machine operates on an automatic cycle controlled by a time-switch, and all that is required of the operator is to load and unload. It is reported that the time-cycle of this new equipment is four min., as against the requirement of four or five hours for previous methods of cleaning a similar quantity of castings.

The firm's Luke and Spencer grinders, being already of a comparatively modern design, were transferred from the old dressing-shop. They are fitted with dust-extraction equipment made by the grinder makers, working in conjunction with "Dusgard" collection equipment by Air Control

FIG. 1.—*View of the new Lee, Howl dressing-shop with, on the right, the shotblasting room and beyond it the barrel-type shotblast unit. Double-ended grinders are situated on the left-hand side.*

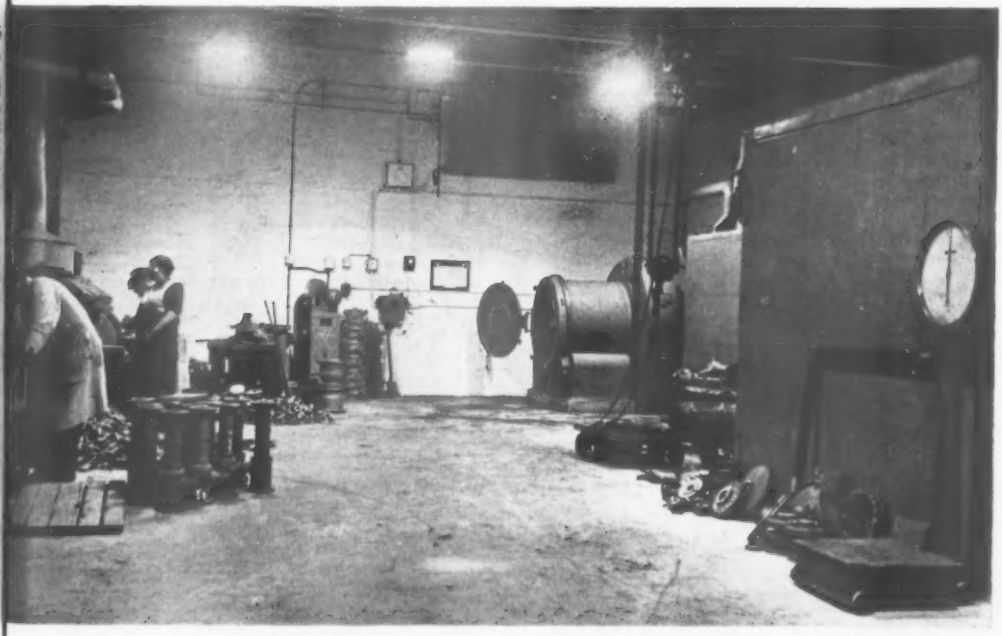


FIG. 2.—*View inside Le Howl's new shotblast room. The steel-plate walls are rubbe covered, and there is an under floor magnetic unit for shot reclamation.*

Installations, Limited. For cutting-off of runners and gates on non-ferrous castings, a new 14-in. dia., abrasive-wheel cut-off machine (by F. E. Rowland & Company, Limited) has been installed. The cutting-off of gates and runners on large castings is carried out by a portable pneu matic cut-off machine which i equipped with an "elastic wheel.

The benches used for han fettling and other small piece of equipment are situated on th opposite side of the dressin shop to the shot-blasting cabine and rumbling barrel, and thi to a certain practical exten facilitates an anti-clockwise flo of work round the outer per meter of the shop, leaving th centre of the floor free (se Fig. 1).

Heating in the new shop i by radiant steam-heated pan radiators (by Wellington Tub Company, Limited); lighting is by tungsten an mercury-vapour bulbs and by natural light through windows which are glazed with Perspex, thu obviating glass breakage. The walls of the sho have been painted to make for easy cleaning.

Machine-tool Industry Harmed?

Criticisms of Britain's machine-tool industry in three recent, unpublished reports were unjustified and had harmed the industry's export potential, claimed the Machine Tool Trades Association in a statement on January 29. The statement was issued to combat "considerable talk" of the reports, the non-publication of which had been taken to indicate a "sad state of affairs in the industry."

"The industry has been well aware of the intensification of competition in all the world markets over recent years and has not allowed any course to meet that competition to remain unexamined," the statement said. "It was, for example, among the van of those who pressed for the elimination or reduction of the so-called 'Strategic Embargo List,' the reduction of which opened additional markets. Its participation at the Leipzig Fair was marked by the immediate purchase of a greater part of its exhibit than was accorded any other participating western country.

Of the first report, a paper by the Department of Scientific and Industrial Research, the MTTA said: "It was compiled with the fullest co-operation of the machine-tool industry." It contained confidential technical information which, if published, would be of advantage to home and overseas companies.

The MTTA said that the second report, by Prof. S. Melman, an American industrial expert, was not concerned with any individual machine-tool manufacturing country in western Europe and perhaps less with the United Kingdom than any other. Publication was a matter for the European Productivity Agency.

About the third report, by the National Production Advisory Council of Industry, the MTTA stated: "This report again is a document prepared for a body, which must be responsible for publication or otherwise."

MI, EMI and Lancashire Dynamo

Metal Industries, Limited, which has been bidding against Electrical & Musical Industries, Limited, fo Lancashire Dynamo Holdings, Limited, declared it offer unconditional last weekend. Both offers were attractive and holders appeared to resolve the problem as to which to accept by selling through the market. Mr. John Black, deputy chairman of MI, said that his board was given confidence in making the announcement in view of the holding already acquired through the market, the encouraging way in which acceptances were coming in, and the substantial promises of support.

It is believed that last Friday week about 500,000 £ ordinary shares worth about £2,000,000 changed hands with the price of Lancashire Dynamo shares rising to a new high level. Sir Joseph Lockwood, chairman of EMI, said the position would be considered, but his company was not prepared to pay "over the odds."

The EMI directors announced last week that in view of the response to their offer and of the substantial buying in the market at above the offer price the company was withdrawing its offer and releasing stockholders of Lancashire Dynamo who had accepted it. The EMI offer, they added, was the highest price which they were prepared to pay for the business, and they "were not prepared to pay to individual stockholders a price not offered to all other stockholders."

Commenting on EMI's withdrawal of its offer, Mr. John Black said: "I am immensely heartened by the news. By coming together we shall be in a position to provide industry with the most complete and advanced techniques in automation." The closing date for MI offer was extended to this week.

Vacuum Treatment of Metals

Types of Equipment available, and their Potentialities when applied to the Foundry and Kindred Industries

During the next two years there will be commissioned a diverse range of equipment for vacuum-melting or vacuum heat-treating steels, ferrous and non-ferrous alloys and refractory metals, on a large and small scale. This will augment the relatively few, but already varied, installations in the United Kingdom which have been built since the war. It is the outcome of several years of pilot-scale trials here, and evaluation of techniques elsewhere—in Germany, Sweden, the US and Russia.

The benefits of melting and refining under vacuum are becoming more widely recognized, with the result that new high-duty materials are being evolved, accepted, and even specified in many applications. In general, vacuum acts as a protective atmosphere, but it also serves in removing absorbed gases (particularly hydrogen), vaporizing volatile impurities, promoting carbon-oxygen reaction, reducing oxygen contents, and permitting alloy additions of reactive elements which are oxidized at a prohibitive rate under normal conditions.

Furthermore, it allows altogether novel refining techniques, *e.g.*, the use of lime coatings on crucible linings to reduce sulphur content. No doubt as familiarity is gained, the concept of vacuum treatment will gain ground, not only for specialized high-quality and necessarily expensive alloys, but also for more nearly conventional materials used in larger quantities.

Melting furnaces in use now are expensive and elaborate; production rates are not high, and by industrial standards the total output is small, although its value is not insignificant. Equipment makers are actively trying to improve the productivity of their equipment, to simplify and reduce its cost, and this naturally happens as operating experience is gained. There are, unfortunately, few equipment makers who also are users, but the pattern will follow that of other furnace developments in recent years. Arc- and induction-melting furnaces are mainly used at present, but melting by electron bombardment may gain ground.

Large-scale Processes developed Abroad

However, in addition to this type of melting and refining equipment, processes are being developed for handling steel under vacuum on a substantially larger scale. In these, instead of at best a ton, tens or hundreds of tons are treated at a time by pouring or sucking into a vacuum system. The degree of vacuum is low, the process time is much shorter, and naturally the degree of improvement is altogether less, but in practical terms it is enough to confer economic advantages. Its cost is attractive, and it is becoming vital for certain classes of steel. In the United States, Germany, and Russia there are already several production installations making various classes of steel, and in this country at least one installation will come into production in the next year or so.

The chief benefit is the reduction of hydrogen content, so that risk of flaking becomes negligible even without heat-treatment. There are the attendant advantages of cleaner compositions, less slag inclusions, and generally more consistent properties, and possibly more important—lower scrap rates. The general conclusion abroad is that this is a valuable new aid to good steelmaking, justifying its extra cost and inconvenience.

Induction Degassing

There is yet another type of vacuum-treatment also being used, which finds a place between bulk-degassing installations and high-vacuum melting furnaces. One of the problems of bulk degassing is the loss in temperature of the charge. In most installations no heat is added, and the treatment time is less than one sec., so an equilibrium can hardly be reached, and there is insufficient opportunity to make alloy additions. In high-vacuum furnaces, expensive pumps and elaborate control, safety and measuring devices are needed. Pump-out and refining times are long, so the output is small. The charge is poured and handled under vacuum. The induction-degassing furnace, however, seeks to overcome these limitations, producing material of quality also between the two. It holds the charge (about one ton) in a crucible and heat is supplied by induction. A relatively less expensive mechanical-pumping system is used, which will not, of course, reach so great a vacuum, and the charge is teemed in air. These features make for higher throughput, and the indications are that they give adequate quality for steels even to the highest specifications.

Numerous variations on this theme exist—the vacuum-arc furnace produces material again of higher quality than the induction-degassing equipment, but the latter could be improved by combining an initial degassing pour, with ladle degassing, and later teeming into ingots in vacuum.

It is unlikely that any of these techniques will gain a clear ascendency over the others and each will be further developed, as each already has its firm adherents and protagonists. The concept of vacuum metallurgical treatment is undoubtedly in embryo and the next few years will show much development. The new installations, which have to be commissioned shortly, are only a beginning.

THE DUTCH FORD FACTORIES have announced that they will start production of the new small Falcon model of their cars in March. In view of the expanding car market their labour force will be increased by 80 workers.

Equipment & Supplies

Automatic Dust-filter

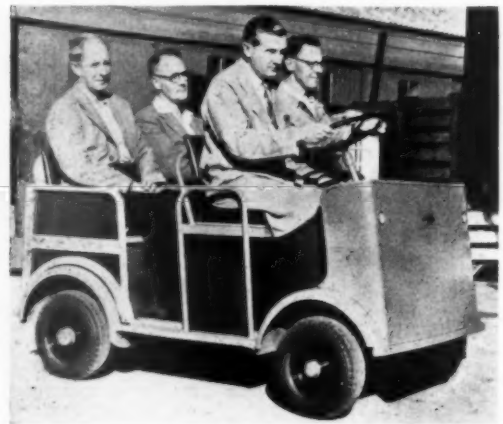
Keith Blackman, Limited, Mill Mead Road, N.17, in collaboration with the German company of Otto Hubbe, are now manufacturing under an exclusive licence arrangement the Fischer automatic dust-filter. This unit is available in two basic types, one of square section containing 24 rectangular "filter-pockets," and the other of circular section containing 27 circular filter sleeves. The principle of operation is that dust-laden air entering the filter passes down into the collection hopper, where the heavy particles are settled out. The air then passes through the fabric filter-pockets in the filter chamber, where the remaining dust is trapped, while the clean air passes out into the main extraction duct leading to a fan, the filter chamber always operating under suction. Two or more of these filters are installed adjacent to one another, the number depending on the volume of air and dust passing into the filters.

Cleaning Cycle

At predetermined intervals, which depend on the conditions under which the plant is operating, a motor-operated damper in one of the filters causes the dust-laden air to by-pass the filter, which then undergoes its cleaning cycle. This same motor simultaneously opens another damper and air is drawn through a purging air-inlet into the filter chamber (which is under suction). This air passes through the pockets in the reverse direction (from outside to inside) carrying the collected dust into the main dust-collection hopper, where most is deposited. The purging air then passes into the inlet duct to be mixed with the dust-laden air which is being directed to the adjacent filters, which are meanwhile in normal operation. While the reverse process is taking place, a high-frequency vibrating mechanism agitates the pockets in a horizontal plane in order to dislodge the dust particles clinging to the filter bags.

Personnel Carrier

The illustration below shows an electric industrial personnel-carrier designed and made by Wessex Industries (Poole), Limited, West Street, Poole. The unit is powered by a 24-v. CAV electric traction-motor, and has a range of about 18 miles.



Bench-mounted Air-operated Grinder

A new air-operated grinder for mounting on work benches has been introduced by the Consolidated Pneumatic Tool Company, Limited, of 232, Dawes Road, London, S.W.6. The new tool, known as the 319OM, has a wheel 6-in. dia. by 1-in. face, the free operating speed being 4,500 rpm. The total height of the unit is 9 1/16 in., and the weight (including guard) 12 lb. the air-inlet connection being ½-in. dia. (male B.S.P. thread). Power is developed by a vane-type motor, one feature of which is a constant-speed governor which maintains the wheel at an efficient cutting-speed from no load to full load and avoids over-speed when running free.

FIG. 1.—*Air-operated grinder made by Consolidated Pneumatic Tool Company, Limited, for bench mounting.*

X-ray Micro-analyser

Cambridge Instrument Company, Limited, 13, Grosvenor Place, London, S.W.1, have developed a scanning electron-probe X-ray micro-analyser for qualitative and quantitative metallurgical analysis. The unit's technique is that of irradiating a minute area of the surface of a metallic sample with a fine-focus beam of electrons, and analysing the resulting emission of X-rays excited in the sample. It is claimed that minute local differences in chemical composition may be detected accurately, thus providing a useful research technique for examining the detailed structure of metals and alloys. The instrument is not restricted to point-by-point micro-analyses; it can also produce X-ray images showing, in turn, the distribution of selected elements over the area scanned. The X-ray image is displayed on one of two cathode-ray tubes. The other tube simultaneously displays a reflection electron image of the same area, so that a direct visual comparison between the surface topography of the specimen and the distribution of a selected element can be made easily.

Temperature Controller and Indicator

A combined temperature controller and indicator has been introduced by Honeywell Controls, Limited, Ruislip Road East, Greenford, Middlesex. Designed for heating and cooling operations, the unit serves the double purpose of controlling and indicating temperatures in ovens, cookers, plating baths, dryers, etc. A highly-sensitive, remote-bulb, liquid-filled thermal system operates a single-pole, double-throw, Honeywell micro-switch which can either open or close a circuit on temperature rise. A selection of ranges is available, from −10 to +650 deg. C., and both case and capillary are fully compensated for ambient temperature variations. The set point can be changed by means of a knob on the front of the case, and both the indicated temperature and set point are made clearly visible by magnifying windows. The steel case is equipped with slotted mounting-brackets, so that the controller can be either surface-mounted on a wall or flush-mounted in a panel.

Storing Plated Patterns . . . . . *By "Checker"*

The correct storing of plated patterns is of considerable importance, for generally, whether made of metal or wood, they are expensive to produce. If they are left lying about, they may become damaged through contact with other equipment, and costly repair charges result.

When plated patterns are not in use, they should be kept in wooden racks near the moulding machines if sufficient space is available, or housed in larger racks specially provided in a section of the pattern stores. The smaller racks can be made at little cost by using strips of rough wood approximately 2½ by ¾ in. or 2 by 1 in. in cross-section. The ends, top, bottom and down partitions can all be made in skeleton form, with three pieces of wood. The ends and down partitions should be suitably battened across at regular intervals, as

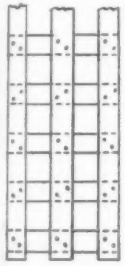


FIG. 1.—*Suitable battening for ends and down partitions.*

shown in Fig. 1. These battens, which are fixed square across, should be spaced so as to serve the dual purpose of holding the down pieces together, and forming the ledges for the plates to slide on. Sufficient space should be left between each ledge so that no plate fouls the one above or below it. However, this problem can be overcome by not using any particular ledge, if an exceptionally deep pattern is to be stored.

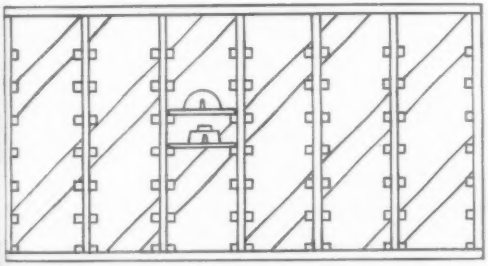


FIG. 2.—*Large rack suitable for a pattern-store, shown with two plates in position.*

Racks for Pattern Stores

A large rack suitable for inclusion in a pattern store is shown in Fig. 2, which gives the front view and also shows two plates in position. Rigidity is given to the rear of the rack by a number of inclined pieces secured at top and bottom, and also where they make contact at the various down partitions. This type of rack is suitable for placing round the pattern-store walls, or at one end of the moulding shop, if more convenient. The distance between the partitions is important—about ¼- to ⅜-in. clearance should be allowed, so that the plates can easily be placed in or taken out of the racks, while still giving a reasonable distance each side of the batten to ledge on. There are, of course, variations of the type of rack shown which are equally effective. For instance, instead of the wall rack illustrated, double racks may be preferred, which are usable from each side, while naturally the actual

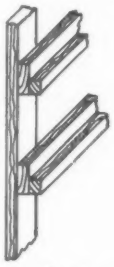


FIG. 3.—*Method of making ledges for patternplates to rest on.*

size must be compatible with the space or spaces available.

Ledges

As an alternative, the ledges for the plates to rest on can be made as illustrated in Fig. 3, constructed by using pieces of wood approximately 1 in. square. These should be fixed to the cross battens as shown, the plates resting on the top of the smaller pieces of wood. Where space permits, racks near the moulding machines can be made to hold six to eight plates, although the number can vary to suit individual

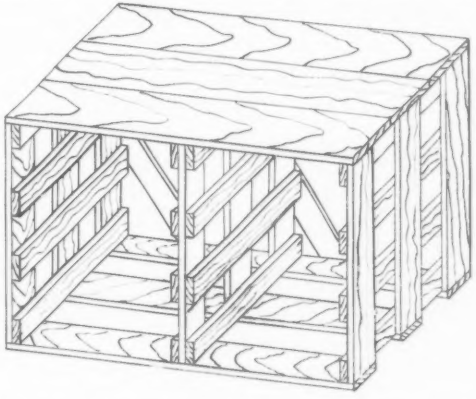


FIG. 4.—*"Skeleton" rack for patternplates which are in constant but not continuous use.*

requirements. Only patternplates which are in constant but not continual use should be kept in them. The racks can be made in skeleton form as shown in Fig. 4, except for the top, which in this instance would be more serviceable if made solid, since it could then be used as a table if desired.

Significance of Defects

Frequently, foundrymen become so engrossed in the possibility of defects occurring in castings that they tend to overlook the fact that industries involved in other methods of forming metals—by welding, forging, pressing or sintering—also have to contend with defects. To show that in some respects, other people's problems (for example, the significance of porosity or discontinuities) can be analogous to those of founders, the following extract is quoted. The remarks appertaining to weld defects have added significance, when it is borne in mind that some founders (steelfounders, in particular) use welding for the rectification of castings.

At the December meeting of the Society of Non-Destructive Examination, Dr. Richard Weck, director of the British Welding Research Association, spoke on "The Significance of Defects in Welds." He emphasized that this was a most complex question to which he could not be expected to give any simple answer. The subject was incompletely understood and there was a need for much work of a fundamental nature and for much more data on service failures. The BWRA was active in both directions, but its present resources were rather inadequate for the task.

It was necessary, he said, to differentiate between defects in welded constructions which were subject only to static loading and those in constructions which were subject to repeated or fatigue loading. The effect of a defect was two-fold. Depending on its size, it reduced cross-sectional area of a structural member, producing a slight increase in the average or nominal stress. This effect, he stated, could generally be entirely ignored under all loading conditions, unless the defect was very large in extent and produced a very considerable reduction in cross-sectional area.

Stress Concentration

The second, much more important, effect of a defect was the production of concentrations of stress. Even this effect might be unimportant under static-loading conditions, provided the material was in a sufficiently ductile condition to reduce the effect of stress concentrations caused by defects, by undergoing plastic deformation. When, however, a material was used below its transition temperature and if, in addition, residual welding-stresses were present, defects played a very important rôle in the initiation of brittle fracture, he stated.

Under conditions of fatigue loading, however, the position was very different. The very high stress-concentrations produced by defects might result in the production of premature fatigue-cracks, with the possibility of early failure. However, even in this case, he did not believe that small, isolated pockets of porosity would have much effect, and he considered it was often a mistake to cut-out such defects. Sharp corners might be introduced into the weld and be left in it after the "repair" had been completed: Dr. Weck believed that such discontinuities had been shown to be capable of doing more damage than the defects which had been removed.

Sometimes many of the worst defects were those in the surface which could be seen with the unaided eye. Small internal defects which could only be revealed by elaborate and costly methods of non-destructive testing were probably the least important. Dr. Weck declared he was not unduly worried about the possibility of failures occurring in butt welds in pressure vessels, but he felt there was some cause for concern about failures occurring in welds joining stand-pipes to pressure vessels. Such welds were harder to make and very difficult to inspect properly. Coupled with this, they were subject to much higher stress-concentrations.

Heat-treatment

It was often considered desirable to heat-treat welds to remove much of the residual stress. However, he was not sure that this was always really beneficial. There was recent evidence which appeared to suggest that if a defect was present at a place where there was a residual compressive-stress, then the structure would be much safer in service if the compressive stress were not removed. In the cast of a tensile stress associated with a defect, the evidence still pointed to the need to remove this stress. The general problem was, therefore, rather complex and it would depend upon circumstances whether heat-treatment was detrimental or beneficial.

Dr. Weck referred to a case where the weld contour had played a more important part than defects in determining the strength of a weld under fatigue. It had been found that on comparing welds made by an automatic process with those made by manual welding that the latter had appeared to be much stronger than the former. The explanation of this was found to be that the hand welding produced a smoother contour between weld and parent metal than the automatic process, where the angle tended to be almost acute.

On the subject of acceptance codes, either in the form of diagrams or radiographs, Dr. Weck declared himself completely opposed to their use. There was not enough basic information available, he said, to permit such codes to be devised. So much depended upon particular conditions that it was not to be expected that useful guidance could be given by codes based merely on empirical considerations. No code could be a substitute for a properly educated inspection-engineer with a wide background of practical experience in design as well as inspection.

Working Days Lost in 1959

Last year saw 1,788,000 more working days lost through industrial disputes than in 1958, in all 5,250,000 days being lost and 644,000 workers being involved. Ignoring the printing dispute, coal mining was the industry most affected by disputes, but the number of stoppages, men involved, and working days lost showed a marked decline.

Days lost in shipbuilding showed a marginal decline, but more than 35,000 of the 315,000 lost were due to demarcation disputes. In metal manufacture days lost more than doubled to 71,000, but nearly half this total was due to the four-day stoppage at the Port Talbot works of the Steel Company of Wales, Limited.

Weekly wage rates increased by just over 1 per cent. compared with 3½ per cent. in 1958, 5½ per cent. in 1957, 7¼ per cent. in 1956, and 7 per cent. in 1955. There was no general increase in most of the major industries, but towards the end of the year a trend towards shorter hours became apparent.

Mr. G. L. HANCOCK, director and general manager of the foundries division of David Brown Industries, Limited, at Penistone (Yorks), has been elected to the Council of the British Steel Castings Research Association, which now operates from premises in Eastbank Road, Sheffield.

Notes from the Branches

East Anglian Section

The January meeting of the East Anglian section of the Institute of British Foundrymen was held in the Lecture Hall, Central Library, Ipswich, when members had the privilege of hearing Mr. A. R. Abraham lecture on the "Production of Foundry Sands." The main theme of the lecture followed the lines of the conference paper of May, 1958, but the slides shown were of the most up-to-date equipment involved in winning and processing sands to meet varied requirements.

The very interesting discussion which followed was opened by a member asking if excessive lime was sometimes found in the sand and, if so, how was it dealt with. In reply, Mr. Abraham said that fine veins of lime were sometimes found, but laboratory tests ensured that the percentage was at a level that would not be detrimental when the sand was used for foundry purposes. Other members who were interested in such matters as moisture content of the sand, permeability, testing, etc., were informed by the lecturer that for reporting laboratory lists an arbitrary figure for moisture content had to be selected, and although the 6 per cent. which he had shown on a chart might appear to be rather high, experience had shown that that figure worked out satisfactorily for the supply of quarried sand. Again, the figure of 75 permeability might also be thought to be rather high for the fine grain of sand he had mentioned, but when taking the sand from the face of a quarry, various grain sizes were met in the different layers, and these were blended to cope with variations in requirements. As to testing, a foundry-type laboratory dealt daily with samples for green-strength, permeability and moisture: test samples were also taken throughout the face of sand exposed in the quarry. The lecturer reported that of all the types of screens tried—including those with electrically-heated wires—piano wirescreens had proved best in their quarry practice.

Replying to a question as to whether it would not be better to employ diesel-engine power-units, because of their mobility, rather than the electrical equipment shown, Mr. Abraham said that in the quarry, long trailing cables were eliminated by carrying cables overhead to all parts of the site. In this way electrical power was at hand to switch on or off as the occasion arose, and no problems of difficult starting during cold weather such as might be posed with diesels were encountered. About 50 men, including maintenance staff were employed, he said, in the quarry described. The evening concluded with Mr. Wincer proposing a very warm vote of thanks to the lecturer.

Birmingham

Approximately 280 members, their ladies and guests assembled for the annual banquet of the Birmingham, branch of the Institute, held at the Botanical Gardens, Edgbaston, at the end of last month. The branch president, Dr. V. Kondic, B.SC., was in the chair, supported by a quite large top table, comprised of prominent members of the local and other branches of the Institute, most of whom were accompanied by their ladies. Following "The Queen," the toast of the branch was proposed by Dr. A. H. Sully, M.SC., director of the British Steel Castings Research Association, and the president responded. This year, the toast list was very short, the only other being that of "The Guests," proposed by Dr. H. T. Angus, M.SC., the response being by Mr. G. R. Shotton, F.I.M., who explained that he was on this occasion acting "on his own ground" in Birmingham as senior vice-president of the Institute, and deputizing for the president of the Institute, who normally attended the function (Mr. C. H. Wilson, the president was in Australia).

Programme Innovation

The accommodation at the Botanical Gardens had been much improved during the past year and its facilities were used to the full, with dancing following the formal part of the proceedings and continuing until 2 a.m. A feature of the programme which was quite amusing was the inclusion of a pseudo- "menu for foundrymen," which included such dishes as: Ice waterglass, lime with CO_2; mixed scrap, potage bentonite, cored shells, rat-tails; dry cope, cod, coke fingers; ground joint, grilled chaplets, refined pig, pelleted buzzard, brazed onions, pickled runners, refractory chips, fresh molasses with flux, deoxidized plumbago pudding, starched graphite-flakes à la Morrogh, green mould, followed by black or white sludge. The organizers and particularly the joint masters of ceremony, Mr. D. P. Smith and Dr. D. V. Atterton, are to be congratulated on staging a really brilliant function.

Couples photographed at the annual banquet of the Birmingham branch. From right to left: Dr. V. Kondic, B.SC.(Birmingham branch president) and Mrs. Kondic; Mr. G. R. Shotton, F.I.M. (IBF senior vice-president) and Mrs. Shotton; Dr. A. H. Sully, M.SC. (director, BSCRA), and Mrs. Sully.

Parliamentary

Coal Utilization Research

Having regard to the enormous turnover of the coal industry, the amounts spent on research into the utilization of coal were absolutely minute, said MR. WOODROW WYATT (Lab.) in the House of Commons last week. Private enterprise would be spending a far higher proportion in similar circumstances. He thought it scandalous that the Gas Council, operating a nationalized industry, should be spending £230,000 on research into the gasification of oil. The Minister ought to persuade it to spend more money on research into the gasification of coal.

MR. RICHARD WOOD, Minister of Power, reminded Mr. Wyatt that the research being carried out by the Gas Council was intended to lead to the gasification of coal. If the Wilson Committee, which he hoped would be reporting in the near future, suggested other lines of research, he would give them every consideration.

MR. EMANUEL SHINWELL (Lab.): "Is it not absurd that after years of propaganda about the need for research into the uses of coal by-products and the like —and after the appointment of a scientific adviser to the National Coal Board in 1946 when the industry was nationalized—there is now talk about setting up a committee to consider the use of coal for by-products?"

Liquid Methane Experiment

Some 9,400 tons of liquid methane, equivalent to about 940,000,000 cub. ft. of town gas, were imported in 1959, at a cost under the arrangements governing the experiment of about £165,000, said MR. RICHARD WOOD, Minister of Power, replying to MR. JOHN CRONIN (Lab.) and MR. ALBERT ROBERTS (Lab.). No specific proposals had been made to him for importing liquid methane on a commercial scale, but such imports would not necessarily be to the disadvantage of coal. Important processes for the gasification of coal which provided a "lean" gas needed enrichment by some such method as this.

The experiments were not likely to go on for very much longer before certain proposals were made to him, the Minister thought.

Bid for Redler Industries

Cash offer of £600,000 for the 1,000,000 ordinary shares of Redler Industries, Limited, Stroud (Glos), makers of conveyors, elevators, etc., has been made by Ley's Foundries & Engineering Company, Limited, Derby. This means that the Derby company is offering 12s. for each Redler 4s. share.

Made subject to the usual conditions, the offer is accompanied with a letter from the Redler chairman recommending acceptance. In the event of the offer becoming unconditional, Redler Industries and its operating subsidiaries will retain their identities and names and, so far as possible, the present executive directors and senior staff will continue to run the companies. The interests of the employees generally will be safeguarded, it is stated.

An offer has since been made by Cozens & Sutcliffe (Holdings), Limited, structural engineers and contractors, of Enfield (Middx), for the ordinary shares of Redler Industries. Shareholders are advised not to dispose of their shares until they have received details of the offer.

Steel Industry Prospects

Speaking at the annual dinner of the Staffordshire Iron and Steel Institute, held on February 5 at Wolverhampton, Sir Julian Pode, managing director of the Steel Company of Wales, Limited, expressed the opinion that prospects for the steel industry were very bright, and that the industry was at the beginning of a period when it could look for very considerable expansion in both the home and export trade. He thought that the secondary industries using the products of the iron and steel industry would also have a boom in the next few years. America, he said, had to a considerable extent priced herself out of the markets, and was not a strong competitor in steel goods. He added that he had recently visited Brazil, Uruguay and Argentina where intake of both consumer and capital goods was going to expand at an enormous rate.

Mr. L. W. Law, president of the Institute, acknowledged the toast to the Institute, which Sir Julian proposed, and the toast to the guests was proposed by Mr. F. V. Wright, senior vice-president of the Institute, Canon A. P. Shepherd responding. During the proceedings, the president presented to Mr. R. Green, foundry metallurgist of Bradley & Foster, Limited, Darlaston, the Institute's £10 award for the best paper written by an associate member.

Law Case

Shotblaster's Claim dismissed

A claim by a shotblaster, for personal injuries, alleged to have been sustained while working at Ruston & Hornsby, Limited, Lincoln, was dismissed by Mr. Justice Stable at Lincoln Assizes on February 5. Mr. Anthony McKay, aged 40, said that on March 25, 1958, he entered the shot-blasting chamber after the fitters had been working on the shotblasting equipment. He turned on the air, but it appeared none was delivered for a second, then suddenly it "kicked" and he was lifted off his feet and fell on his back on the casting in the chamber. Although his back felt numb, he did not think he had injured himself seriously. McKay told the judge that he did not report the accident to the works nurse because he thought it would be better next day, but the next morning he could not move in bed because of the pain in his back. He said he still suffered pain.

It was submitted on behalf of Ruston & Hornsby that there was no accident. If there was, it was said, there was nothing wrong with the apparatus. McKay's foreman knew nothing of the accident until five weeks later. The judge in dismissing the claim said: "There is not a tittle of evidence that there was anything wrong with the equipment and there is no ground for saying the company were responsible for the injury Mr. McKay sustained or for his special damages." He made no order as to costs.

MR. WILLIAM ROWNEY, senior partner of William Rowney & Son, brassfounders and engineers' furnishers, Glasgow, has died at the age of 74.

The death occurred on February 4, at the age of 55, of Mr. JOHN SMEDLEY, chief production engineer of Rolls-Royce, Limited, aero-engine division, Derby. He had been associated with the company for 42 years.

IBF Malvern Conference Fund

The Council of the Institute of British Foundrymen acknowledges with appreciation the following donations to the Malvern conference fund which have been received in addition to those listed in the January 14 issue of the JOURNAL. The list is not yet closed and Dr. H. T. Angus of the British Cast Iron Research Association, Alvechurch, Birmingham, who is honorary treasurer of the fund, will be glad to receive additional subscriptions:—

	£	s.	d.
Previously acknowledged	1,608	14	0
British Piston Ring Company, Limited	75	0	0
William Jacks & Company, Limited	52	10	0
W. & T. Avery, Limited	50	0	0
Humber, Limited	50	0	0
Darby & Company (Birmingham), Limited	25	0	0
John Thompson Castings, Limited	25	0	0
Premo Pattern Company, Limited	10	10	0
Cox & Drake, Limited	3	3	0
	£1,899	17	0

Commonwealth Exhibition

Sir Eric Harrison, doyen of the High Commissioners to the United Kingdom, and son of a Birmingham craftsman who emigrated to Australia, opened the Commonwealth Exhibition, in Birmingham, on February 4 (closing date February 20). To coincide with the main exhibition in Bingley Hall, the Birmingham Chamber of Commerce staged a subsidiary display in which Midland firms participated, and the Birmingham Engineering Centre organized a show of Midland engineering products at its premises in Stephenson Place.

Amongst items of special interest in the Birmingham Chamber's section were a model of the King's coach in the Royal train used during the South African tour of 1947, shown by the Metropolitan-Cammell and Wagon Company, Limited; a three-link-chain cable, similar to that used in the new liner Canberra, made by Samuel Taylor and Sons (Brierley Hill). Limited: electronic controllers which automatically control heat in a furnace, displayed by Integra, Leeds and Northrop, Limited, of Birmingham, and a full range of the products of W. and T. Avery, Limited, of the Soho Foundry. In the forecourt of Bingley Hall, some of the scope of the activities of Foundry Services International, Limited, was displayed.

Mr. STANLEY PEARCE, who since 1945 has been export sales manager of F. Perkins, Limited, diesel-engine manufacturers, of Peterborough, has retired at the age of 69. From 1909 until 1914, Mr. Pearce was associated with his uncle's agricultural machinery manufacturing business in Russia. After army service in England, he returned to Russia in 1916 to work on munitions' manufacture, leaving during the Russian Revolution. Afterwards, he held appointments in Europe and South America and later formed his own import-export business in London.

DR. H. G. CUMMING, senior lecturer in mathematics at Birmingham College of Technology, has been appointed Head of the Department of Aeronautical Engineering at the new Lanchester College, Coventry; he will take up the post after Easter.

Fletcher, Houston Group plans New Purchase

Products covering a wide field for the engineering industry are now manufactured by the Fletcher, Houston & Company, Limited, group, and plans are in hand to buy for £420,000 in cash another Midland company to add to the list of companies in the group working outside Fletcher, Houston's original field of ironfounding.

The chairman, Mr. Walter West, said that during the year to September 30, 1959, forgings, castings, and finished units for the motor industry contributed substantially to output. There was some slackness in the forge and foundry in the first six months, but demands on both departments increased steadily during the second half of the year to a state of high pressure. Output was maintained at a satisfactory level throughout the year in all other sections of the group.

An increase in authorized capital will be proposed to provide for the two-for-one scrip issue and give a reserve of unissued capital for possible future acquisitions. Members are told that the proposed capitalization issue does not imply that total dividend distribution for the current year will again be increased. Group net profits were higher in 1958-59 at £88,128 (£74,452) and the dividend is 80 (70) per cent.

ICI's "Wages by Credit" Scheme

Details of a successful experiment in paying wages into an employee's bank account have been revealed by Imperial Chemical Industries, Limited. Cheques are not involved in the system, which operates by an instruction to the paying bank to credit the required amount of wages to the receiving banks where employees' accounts are kept.

The scheme was introduced at the Wilton works (Yorks) in May, 1958, at the request of weekly-paid employees. The employee gives a written request to the company for his wages to be paid each week to a bank account at a branch he may choose from a list of about 70 branch banks in the Tees-side area. Afterwards, the money is automatically credited weekly to his account.

Although the scheme is still regarded as experimental, its success may be gauged by the increasing numbers using it. When the experiment was launched, 226 (or 3 per cent.) of the 7,494 weekly-paid employees made use of the new facilities. By December last year, 1,968 (24.2 per cent.) of 8,148 weekly-paid employees were receiving their wages in this way.

Maintenance Man survives Furnace Fall

Mr. James Shelton, a fitter employed by the Stanton Ironworks Company, Limited, was awarded £3,000 damages as a result of a fall from a ladder while servicing a furnace. Mr. Justice Stable decided that Mr. Shelton was gassed before he fell, as the expert witness, Professor James Webster, stated that this would render Mr. Shelton unconscious, create limpness and thereby mitigate the result of the fall. If it had been an ordinary fall, the man would probably have been killed.

SIR HAROLD SMITH, who retired as chairman of the Gas Council at the end of last year after more than 50 years in the gas industry, has joined the board of the Milford Docks Company, Limited, and has been elected chairman. He succeeds Mr. F. G. MITCHELL, who has resigned from the board owing to ill-health.

New Patents

(Copies of complete specifications are obtainable from the Patent Office, Sales Branch, 25, Southampton Buildings, Chancery Lane, London, W.C.2, price 3s. 6d.)

811,873. Die Casting Machine Tools, Limited, and A. R. Mills, River Works, 152, Green Lanes, Palmers Green, London, N.13.

A die-casting machine wherein brush means are provided for brushing the two dies simultaneously after they have been moved apart. The brushing of the dies' surface to keep them clean is preferably carried out by a wire brush or brushes, which may be arranged also to lubricate the dies with a graphite solution—as is sometimes required when new dies are taken into service.

812,203. Bakelite, Limited, 12, Hobart Place, London, S.W.1.

A method of uniting composite parts of moulds and cores comprising sand and a synthetic resin. The invention provides an adhesive for this purpose which maintains a uniform viscosity over a prolonged period. A slurry or paste comprising a solid resin as an adhesive for the bonding of composite parts is also claimed.

812,216. Geraetebau-Anstalt Balzers, Liechtenstein.

A device for the tapping of fused media of high temperature, preferably of molten metals, through the bottom of the crucible which makes it possible to interrupt the poured jet if necessary, and thereby to tap the fused charge from the crucible in several batches.

812,241. Dow Chemical Company, Midland, Michigan, USA.

Die-casting machine adapted for use with molten magnesium-alloys having an easily-replaceable cylinder liner. There is also provided an easily-replaceable pump assembly.

812,352. Metropolitan-Vickers Electrical Company, Limited (now Associated Electrical Industries (Manchester), Limited), 1-3, St. Paul's Churchyard, London, E.C.4.

The manufacture of a mould or core, for, or as part of, a casting process. This is manufactured wholly or partly of a refractory mixed with aluminium phosphate, which, after being applied to a pattern or otherwise formed as a casting mould or core or part thereof, is subjected to ammonia gas, whereby the material is solidified.

812,356. Zygmunt Stokowiec, 176, Boythorpe Road, Chesterfield, Derbys. Zbigniew Zdzislaw Jerzykosarski, 3, West Avenue, Mansfield, Notts., and Sheepbridge Alloy Castings, Limited, Hamilton Road, Sutton-in-Ashfield, Notts.

Gravity-fed die-casting of non-ferrous metal bars, rods, tubes, and sections.

812,380. J. B. Brennan, 13018, Lake Shore Boulevard, Cleveland, 8, Ohio, USA.

Improvements in, or relating to, continuous casting of strip or rods.

812,426. Foundry Services, Limited, Long Acre, Nechells, Birmingham, 7.

Improvements in the production of shaped articles of exothermic heat-insulating and refractory granular materials for use in metal casting. (See also B.P.'s 627, 678*, 758, 193*, FOUNDRY TRADE JOURNAL, Nov. 22, 1956, 774,490*, 774,491*, 772,273*, and 785,984†.)

The exothermic and/or heat-insulating, and/or refractory materials are compacted into the shaped articles. To the surface of the shape obtained there is applied a layer of fabric such as asbestos gauze, impregnated with a self-setting plaster such as Plaster of Paris. Thus improved rigidity is obtained.

* Exothermic mixtures claimed to be suitable.
† Heat-insulating and refractory materials formed into shaped articles.

Film Review

Hazard, available (in 16- and 35-mm. copies) from the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1. The running time is 36 min.

This film has been prepared with the object of focusing attention on an orderly approach to the subject of accident prevention. It was a brilliant notion to take the most hazardous of all sports—that of rock-climbing—and to correlate it with industrial accidents. It gave infinite scope for colour photography in the Dolomites, intense drama (well acted), a modicum of love interest, and, throughout, the message of the need to acquire safe habits and adhere to them. The film will make a special appeal to youth and will leave an indelible impression on their minds. Many of the shots, to use the jargon of the publicity fraternity, were "breath-taking," and "hair-raising"—and the reviewer confesses that at some of the crucial moments, he preferred to look away from the screen and that he appreciated a stiff drink at the conclusion. Without reservation, his opinion is that this is the finest safety-precaution propaganda film ever presented in this country.

V. C. FAULKNER.

Massey-Ferguson's Reorganization in the UK

Under the reorganization of the engineering division in the UK of Massey-Ferguson, Limited, Dr. B. F. Willetts has been made chief engineer, UK, under the direction of Mr. Ewen M'Ewen, director of engineering, Europe. Dr. Willetts carried out research for the Ministry of Supply and subsequently served for a number of years with Vickers-Armstrongs, Limited, before joining Massey-Ferguson in 1958. His two assistant chief engineers are Mr. L. E. Summerfield (implements) and Mr. H. R. Jenner (combine harvesters). Mr. Summerfield was for 13 years with Bendix, Limited (later Girling, Limited), and Mr. Jenner joined Massey-Harris, Limited, Toronto, in 1923.

Mr. M'Ewen, who is responsible for all functions of engineering design, development, and research, not only in the UK, but also in France, Germany, and India, was a leading authority on fighting vehicle design during the war. In 1947 he was appointed Professor of Agricultural Engineering, King's College, Durham. From 1955 to 1958 (when he joined Massey-Ferguson), he was director, UK Armament Research Development Establishment.

Another recent appointment within the UK engineering division is that of Mr. Charles Hunt, who has become chief test engineer. Before joining the company he held various senior appointments with Vickers-Armstrongs.

Publications Received

GEC Export Guide Vol. IV No. 1. Issued by the Economic and Marketing Research Unit of the General Electric Company, Limited, Magnet House, Kingsway, London, W.C.2.

This issue shows the prospects for British exports to 34 major markets of 35 product groups. The outlook for the first three months of 1960 is stated to be "good" in 21 countries, "improving" in four countries and "unchanged" in 9 (two at "good," five at "improving" and two at "deteriorating"). There are no markets in which the situation is either "deteriorating" (since the last (October, 1959) issue) or "bad."

Countries in which prospects for British exports have improved since October, 1959, include the Federation of Rhodesia and Nyasaland, Malaya and Singapore, Norway, Sweden and South Africa. There are no major markets where prospects have changed for the worse and only in Iraq and Venezuela does the outlook continue to be poor.

Passing on to consideration of the United States, it is stated that for many years since the war, the US has achieved a substantial commercial export surplus because of its strength as a major exporter of raw materials and primary products as well as of most manufactured goods. This advantage, however, is beginning to decrease as domestic materials become used up and the United States becomes more dependent upon foreign supplies.

The removal of discrimination on dollar goods by the United Kingdom, likely to be followed by most other countries, will not spell immediate improvement for United States export trade. Price makes some American products uncompetitive and furthermore, United States exports have also been excluded from markets where others have been able to develop freely. Hence winning back markets may require aggressive methods.

American private investment abroad, together with foreign aid, is expected to total £1,600,000,000 in 1959. An outflow of such magnitude, if unchecked, would quickly reduce the United States' gold reserves below the level of her short-term foreign liabilities. Despite this drain the Americans have not made aid conditional upon spending the monies in the United States, nor have they contemplated reducing the volume of aid. The American government has so far refused to be stampeded, for, apart from some strings attached to grants from the Development Loan Fund, other aid remains unconditional (except for Export-Import Bank loans which have always been tied). Far from reducing aid, the President is seeking increased funds in order to maintain it at a high level.

Guide for Buyers. Published by the National Federation of Engineers' Tool Manufacturers, Light Trades House, Melbourne Avenue, Sheffield, 10; price 5s. post free.

In advertising and publicity, it is a *sine qua non* that the snob appeal is a certain winner, thus it will be interesting to see which one of the many buyers' guides will be the first to change over to a guide for purchasing officers. It so happened that when examining the booklet for review one of the JOURNAL's translators—an Austrian by birth—looked at the opening paragraphs and remarked that whilst one of them was a correct translation it was not German. The booklet first tells something of the organization which has published the book, and then lists the membership, each name carrying a code letter, which indicates the respective association to which the firm is affiliated. This is followed by alphabetical lists of tools in English, French, German and Spanish. By so doing, the brochure is limited—perhaps intentionally—as a technical dictionary. Part 3 of the Guide details the products covered by a number of trade associations within the general membership, and Part 4 lists the trade marks of the members. Unquestionably, this will be a book much used by the purchasing officers of the engineering industries at home and abroad.

Accident Prevention in Hand Rolling Mills in the Iron and Steel Industry. Published by the British Iron and Steel Federation, Steel House, Tothill Street, London, S.W.1.

The intense work being undertaken by the iron and steel industry with the objective of reducing accidents is exemplified by this well-illustrated 26-page brochure. It describes in great detail the steps which have been taken by a sub-committee specially appointed for the task. In the summary and main conclusions on the factors which make for inefficiency and consequently result in accidents are mentioned several which are common to foundry practice, they are:—inadequate training; untidiness; inadequate maintenance (especially of floors); poor guarding of machines, and the usual trouble with protective clothing. A study of the manner in which this problem of accident-prevention has been tackled by a sister industry will, undoubtedly, be rewarding to founders.

Safety in the Use of Abrasive Wheels. Published for the Ministry of Labour and National Service by Her Majesty's Stationery Office, York House, Kingsway, London, W.C.2; price 4s. net.

This publication, which is illustrated by photographs and diagrams, describes the characteristics of abrasive wheels, and deals with the safety aspects of their use, storage and mounting. Types of guards for abrasive wheels, materials for their construction and additional precautions which can be provided are described, and advice is given on precautions which should be taken to prevent injuries resulting from contact with a wheel while it is in motion. Protection from eye injuries caused by particles thrown off from the wheel or from the work being ground, is also dealt with. Although not intended to interpret the legal requirements of the Factories Acts, the booklet lists the parts of the Acts and Regulations affecting the use of abrasive wheels. It points out that advice and information on these matters is freely available from factory inspectors.

Steel Castings in Welded Construction. Published by the British Steel Founders' Association, Broomgrove Lodge, 13, Broomgrove Road, Sheffield, 10.

Though it is perfectly obvious that a complicated steel casting can be made more cheaply and sounder by breaking it down into easily cast parts and then welded into a complete unit, yet it has proved to be a difficult proposition to sell to the designer. It is also not easy to combine steel sections and steel castings to create an engineering unit. The issue of this 24-page well-illustrated brochure should go far in impressing on the minds of designers, the great potentialities of the system.

Birmid Industries, Limited, announce in respect to Birmabright, Limited, and Birmetals, Limited, Woodgate, Birmingham, that Mr. W. C. JORDAN (deputy managing director) has been appointed joint managing director; Mr. R. T. RAVEN (works director) has been appointed director and general manager, and Mr. C. J. SMITH (works metallurgist) becomes technical director. In the case of Sterling Metals, Limited, Nuneaton, Mr. T. PLAYER (manager—iron division) has been appointed a director.

Personal

Mr. E. W. HAGUE has retired from the board of Thos. Firth and John Brown, Limited, after 46 years with the company.

Mr. GEOFFREY B. ASHTON has been appointed joint assistant managing director of Higgs Motors, Limited, of Witton, Birmingham.

Sir IAN JACOB who retired as director-general of the British Broadcasting Corporation at the end of last year, has joined the board of Electrical and Musical Industries, Limited.

Mr. W. F. TRAFFORD has relinquished his position with Arthur Shaw & Company, Limited, of Willenhall, to take up an executive position with Edward Matthews, Limited, of Bilston.

Mr. H. DEMEL who for 15 years has been managing director of Harrison (Birmingham), Limited, brass-founders, etc., Bradford Street Works, Birmingham, will be retiring at the end of June.

Mr. CHARLES AXE, sales representative in Sheffield for the English Electric Company's domestic-appliance division, has been appointed Manchester area manager. He has been with the company since 1949.

Mr. B. MALONE has joined the new Foundry and Metallurgical Equipment Company, Limited,—one of the Efco group of companies. He was for many years works manager of Southern Foundries, Limited.

The Rev. LIONEL PRIEST, who left Newton Chambers and Company, Limited, Chapeltown, Sheffield, and entered the ministry of the Church, has been appointed Rector of St. Andrews, Broad View, Vancouver.

Mr. E. P. COLLINS, advertising manager of the Morgan Crucible Company, Limited, and its associate companies, has recently been elected hon. secretary of the Incorporated Advertising Managers' Association.

Mr. B. L. PAGE has relinquished his executive appointment with John Dale, Limited, and has retired from the boards of directors of the company and its subsidiaries. Mr. NORMAN DRAYCOTT has been appointed a director.

Mr. CHARLES D. HARRIS, who for the past four years has been in charge of the office-methods department of the Ford Motor Company, Limited, has been made an executive director of Television Audience Measurement.

Mr. K. B. TOLLEY has been appointed export manager of Hadley Telephone & Sound Systems, Limited, Smethwick, Staffs. He intends to establish a network of overseas agents, preferably those with existing market connections.

Mr. S. T. SHIPWAY, technical engineer and designer with Modern Machine Tools, Limited, Broadgate House, Coventry, received a presentation from the managing director, Mr. P. E. Verrall, on completing 25 years' service with the company.

Borax Consolidated, Limited, announce the appointment of Mr. G. N. BLOW as their Midlands-area manager in succession to the late Mr. D. G. B. SLEATH. Mr. Blow has been with the company since 1953 as a local representative in the Birmingham area.

Mr. O. D. GWILLIAM, formerly works manager of W. C. Holmes and Company, Limited, Huddersfield, has been appointed assistant general manager to Foster, Yates and Thom, Limited, precision engineers and boilermakers, Blackburn. This is a newly-created post.

Sir JOHN WRIGHTSON, BT., vice-chairman, Head, Wrightson and Company, Limited, engineers, Thornaby-on-Tees, has been appointed chairman and managing director in succession to Mr. RICHARD MILES, who has resigned from these posts but remains on the board.

Mr. C. G. DAVIS has been appointed general manger of the Redbourne works of Richard Thomas and Baldwins, Limited, in succession to Mr. W. O. CAMPBELL ADAMSON who was recently appointed general manager of the new works being built at Llanwern.

The Messel Medal, the senior award of the Society of Chemical Industry which is awarded every two years, will be presented to the medallist for 1960, the Rt. Hon.. the VISCOUNT CHANDOS, D.S.O., M.C., in Bristol, on Wednesday, July 6, during the annual meeting of the Society.

Mr. A. F. GADSBY has resigned his directorship of Brymbo Steel Works, Limited, near Wrexham, owing to pressure of other work. Mr. P. W. MEADOWS, who has held various positions at Brymbo since 1938 and has been the company's secretary since 1953, has been appointed a director.

Mr. A. E. STURDY, M.B.E., who has been secretary of the Russo-British Chamber of Commerce (Inc.) for the past 25 years, retired at his own request on February 8, on reaching the age of 65. His successor is Mr. H. E. S. HAYWARD, formerly the assistant-secretary of the Chamber.

Mr. G. FETTES WADDINGTON, export manager, Wolf Electric Tools, Limited, London, is making an extensive tour of Australia. Throughout his three months' visit to the Dominion, Mr. Waddington's headquarters will be at Wolf Sales Pty., Limited, Arthur Street, Homebush, Sydney—a Wolf associate company of which he also is a director.

Mr. H. W. A. WARING, C.M.G., managing director of Brymbo Steel Works, Limited, who was recently elected to the board of the parent company, Guest Keen & Nettlefolds, Limited, has been re-elected chairman of the steel committee of the Economic Commission for Europe for a second year. He is the first British chairman.

Mr. T. H. SHAW, general sales manager of Thos. Firth and John Brown, Limited, Sheffield, since 1958, has been appointed a director. Mr. J. R. EDWARDS, works superintendent and a special director of Shepcote Lane Rolling Mills, Limited, has been appointed a director, and Mr. F. BROWN, chief engineer, has been made a special director.

Mr. HAROLD HEATH, immediate past-president of the Coventry and District Engineering Employers' Association, has been elected chairman of the Midland Counties Regional Committee of the Engineering and Allied Employers' National Federation. Mr. Heath is chairman and managing director of Coventry Radiator and Presswork Company, Limited.

Dr. T. LUPTON who was recently granted £29,000 for a five-year research project on social factors affecting workshop behaviour, has been appointed head of the Department of Industrial Administration at Birmingham College of Advanced Technology. He takes up the post on April 1 and will continue his research project in Birmingham with a team of research Fellows.

Mr. D. FLEMING, formerly chief metallurgist with Textile Machine Makers, Limited, has accepted a similar position with Refined Iron Company (Darwen), Limited. Mr. Fleming is one of the leading authorities in the field of hot-blast cupolas and this experience will be valuable to his new company who have a

very extensive melting re-equipment programme on hand, which includes installation of hot-blast cupolas.

Foundry Services International, Limited, announce that Mr. B. HOWARD WILLIAMS has been appointed a director of Foundry Services Australia Pty., Limited. Mr. Williams joined the Foseco organization in 1951 and has been general manager of the Australian company since 1958. Mr. ROBERT W. FLINT, who joined the Foseco organization in 1950, has been appointed general manager of the associated Indian company, Greaves Foundry Services Private, Limited.

Associated Electrical Industries, Limited, announce the appointments of Mr. O. T. EVANS as manager of the new plant applications engineering department of the heavy plant division, with headquarters at Rugby, and of Mr. W. SPENCE as deputy manager of the new department. Mr. J. N. M. LEGATE has been appointed manager, control gear engineering department (Manchester), of AEI motor and control gear division, and Mr. C. T. SCARF is now chief control gear development engineer of the division.

The head of the physics department of the British Iron and Steel Research Association, Mr. S. S. CARLISLE, M.SC., A.M.I.E.E., has been appointed an assistant director, in which capacity he will be mainly concerned with the co-ordination of the Association's work on automation and the handling of information. Mr. Carlisle, who is a graduate of the Queen's University, Belfast (College of Technology), in electrical engineering, was granted the degree of M.SC. in 1942. He joined BISRA in 1946, and in 1947 was appointed head of the instruments section of the physics department. He was made head of the South Wales laboratories in 1954, and in 1958 he returned to London to take up his present position. Mr. Carlisle was one of the delegates who visited the USSR in 1959 to study automation research and development in Soviet industry; he has served on the Council of the Society of Instrument Technology and has held the office of chairman of the South Wales section of that Society.

Plans for merging the resources of Reynolds T.I. Aluminium, Limited, and the British Aluminium Company, Limited, are now well advanced and the following changes of appointments are announced. The changes are effective from February 1 and, pending completion of the plans, the new appointments will cover the operations of both companies. From the British Aluminium Company, Limited, Mr. GERALD LACEY (commercial director) has been appointed executive director (forward planning); Mr. G. A. ANDERSON (director and general sales manager), will be director of products and development, Mr. J. SALTER (director and general production manager) director of engineering and Mr. W. B. C. PERRYCOSTE (director and general production manager), director of production (primary products). From Reynolds T.I. Aluminium, Limited, the chief executive sales, Mr. BASIL JAMES, will be director of sales and Mr. PAUL R. MCGEHEE (director and general production manager) has been appointed director of production (manufactured products).

Mr. THOMAS CLAUDE JAMES, chairman and joint managing director of Wolverhampton Metal Company, Limited, Wednesfield, and one of the founders of the company, has died at the age of 74. Mr. James was also chairman and joint managing director of three subsidiaries: Barton Williams & Company (Birmingham), Limited; Hayes Metals (Gloucester), Limited; and James Bridge Copper Works. He had been president of the Copper Refining Association, president of the Brass and Bronze Ingot Manufacturers' Association and a member of the Association of Light Alloy Refiners.

News in Brief

ALLIED IRONFOUNDERS, LIMITED, are sponsoring a Rayburn Room-heater Fortnight, from February 15 to 29.

THE TELEPHONE NUMBER of Erifco, Limited, ironfounders, Manor Road, Erith, Kent, is now Erith 33426/7.

MORGAN CRUCIBLE COMPANY, LIMITED, of Battersea, is sending about 50 of its managers on computer courses during the next six weeks.

A COMPREHENSIVE CONTRACT for all the electrical equipment in three steel-rolling mills has been awarded to the English Electric Company, Limited, by Colvilles, Limited, for their new Ravenscraig plant, near Motherwell.

AUSTRIA INCREASED its output of raw steel by 5 per cent. last year, the 1959 total of 2,520,000 beating that of the previous record year (1957) by 110,000 tons. Pig-iron output was up by 1 per cent. to 1,840,000 tons.

CHIEF SPEAKER at a trade luncheon of the Gauge and Tool Makers' Association, to be held at the Savoy Hotel, London, W.C.2, on March 31, will be Mr. John Rodgers, Parliamentary Secretary to the Board of Trade.

TWO FURTHER "Introduction to Industry" training courses have been arranged for April at the Chippenham works of the Westinghouse Brake & Signal Company, Limited. The courses are available to boys taking "A" level science subjects.

Mr. A. T. HOYLE has retired from the firm of James Hoyle and Son, 50, Andrews Road, Mare Street, Hackney, London, E.8. His retirement involves the dissolution of the partnership with his son, Mr. E. J. S. Hoyle, who will carry on the business.

IN CONNECTION with the "War on Want" Exhibition held last month at Westminster Hall, London, Hugh Wood & Company, Limited, of Gateshead-on-Tyne, produced a special brochure showing how the use of conveyors has helped progress in under-developed areas.

HEAD WRIGHTSON MACHINE COMPANY, LIMITED, has received an order worth £233,000 from the Steel Company of Wales, Limited, for a high-speed cut-up line for its Abbey Works. The line takes coils of cold-rolled strip-steel and converts them into sheets of different lengths.

BREN MANUFACTURING COMPANY, of Team Valley, Gateshead, a branch of the R. W. Crabtree organization, has produced a new sheet-metal grader for an American company, the F. J. Littell Machine Company, manufacturers of sheeting lines and other equipment for handling metal in coil.

THE SPEAKER at the February meeting of the Non-Ferrous Club, held in Birmingham, was Admiral the Hon. Sir Guy Russell, who related anecdotes from his long experience in the Navy. A collection taken at the meeting in support of the National Association of Boys' Clubs realized £24 7s.

CRAVEN BROTHERS-CRANE DIVISION, a subsidiary of Herbert Morris, Limited, of Loughborough, have been notified by Richard Thomas and Baldwin, Limited, of their intention to place an order for a number of heavy-duty cranes for the new steelworks near Newport, the value is approximately £300,000.

Mr. HAROLD B. RIGGALL, deputy chairman of Ruston and Hornsby, Limited, engineers, Lincoln, who retired from the post of managing director at the end of last year, has been presented with a water colour of Lincoln, showing the Pelham Bridge and Cathedral, and part of the Ruston works.

ON PAGE 8 of an information publication issued by Rocol, Limited, Swillington, near Leeds, is printed notes on the lubrication of various types of foundry equipment such as coreboxes, pneumatic sandrammers, sand slingers, ladles and hand grinders. The lubricants recommended are all molybdenized.

ASHMORE, BENSON, PEASE & COMPANY, of Stockton-on-Tees, have received, through the Fluor Engineering and Construction Company, orders worth more than £250,000 from Petroleos Mexicanos. The orders are for the supply of fabricated refinery equipment for the Minatitlan Refinery, near Vera Cruz, Mexico.

ROTHERHAM RURAL COUNCIL on February 1 accepted an offer by the Yorkshire Electricity Board to instal floor-heating in a pair of houses to be erected by the Council. The East Midlands Gas Board and the National Coal Board are being invited to put forward the claims of gas and coal for house heating.

THE RAILWAY-TRACTION DEPARTMENT of Rolls-Royce, Limited, is being transferred from Derby to Shrewsbury, where the headquarters of the oil-engine division is already situated. It was announced on February 3 that sales of Rolls-Royce diesel railcars and locomotive engines since 1956 had exceeded the 1,000 mark.

NEWTONS (IRONFOUNDERS), LIMITED, of Vickers Street, Miles Platting, Manchester, 10, announce that they have now obtained registration under the Trade Marks Act, 1938, for their range of refined-iron and alloyed-iron castings. These will now be marketed as Nionite castings and will cover their full range of output up to 12 tons weight.

WITH THE AIM of stepping-up production of the new Popular car from the present daily average of 175 to about 250, a night-shift has been started at the Doncaster factory of the Ford Motor Company, Limited. Nearly 200 extra operatives have been engaged and by midsummer it is expected that the labour force will have been built up to between 400 and 500.

IAN N. MERRILL & COMPANY, LIMITED, chemical engineers, Cavendish Road, Sheffield, are moving to new premises at Dronfield, Derbyshire, because of the difficulty of securing land for the extension of their works in Sheffield. The new works will enable the production of the company's chemicals, for use in metal processes and in oilfield activities, to be advanced.

SIR ANDREW MCCANCE, chairman and managing director of Colvilles, Limited, has announced that to further the Ravenscraig expansion his company have contracted with the British Oxygen Company, Limited, for the erection of a "tonnage" oxygen plant with a 200-ton daily capacity. A second similar plant will follow immediately for use at two of Colvilles' other works.

HULL CHAMBER OF COMMERCE AND SHIPPING have decided to protest in the strongest possible terms against the proposed withdrawal of Patent Office publications from various public libraries in the country, including Hull. The president, Mr. G. E. Sanderson, said the loss of such publications would be serious. He understood that about 100 were out on loan from the Hull Public Library every week to industrial concerns.

A COMPLETE SET OF CHESSMEN each 2-ft. high, made out of cold-rolled strip-steel and standing on a large chess board, will be the main feature of the stand of the Guest, Keen & Nettlefolds Group at the Leipzig International Trade Fair, to be held from February 28

(Continued on page 182)

FESIL SILICON BRIQUETTES

- Fesil Silicon Briquettes are produced in Norway, the largest producing country of Ferro Silicon Alloys in Europe. Thus the Briquettes are manufactured right on the doorstep of raw material supplies required for such production.

- Fesil Silicon Briquettes are produced by modern methods and under strict metallurgical control.

- Fesil Silicon Briquettes are available for prompt delivery from stocks held in the United Kingdom.

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MANUFACTURERS OF MANGANESE, SILICO-MANGANESE AND OTHER FERRO ALLOY BRIQUETTES

News in Brief

(*Continued from page* 180)

to March 8. The stand is being organized by the G.K.N. Group Export Service Organization under the direction of Mr. K. R. Turner, one of the export executives.

AMONGST CONTRACTS RECENTLY RECEIVED by Hayward Tyler & Company, Limited (a member of Stone-Platt Industries, Limited) are those for large-capacity centrifugal cargo oil pumps for three 77,000-ton d.w. tankers to be built by A. G. "Weser" for the Esso Group. Each vessel will be fitted with three cargo pumps, and in addition the firm will supply one centrifugal ballast pump of 1,350 tons sea water per hour capacity for each ship.

THE JOURNAL HAS RECEIVED from the Morgan Crucible Company, Limited, of Battersea, London, S.W.11, their 1960 diary; the lateness of receipt is no doubt an aftermath of last year's printing trade dispute. It is more than a diary, however, as it carries a wealth of technical and other data as well as a series of sectional maps. Recipients of the diary can indeed count themselves fortunate, as it is extremely useful, in particular for non-ferrous foundrymen.

PARAFFIN-DELIVERY MEN IN ROTHERHAM are being asked by the borough's chief fire officer, Mr. Joseph Smith, to publicize the dangers of fire from paraffin heaters. He is asking them to deliver as they call at homes a copy of the issue of the fire-protection bulletin dealing with this question, together with a letter from himself. His letter states, "Along with other fire officers throughout the country, I am becoming perturbed at the number of fires in domestic premises which are caused by paraffin heaters."

IN the BOARD OF TRADE *Journal* (issue February 5) is published a comprehensive and up-to-date list of goods subject to strategic embargo. The new list makes a number of routine changes; four items have been deleted (milling machines for aircraft spars, germanium, cobalt compounds, and petroleum-based hydraulic fluids); and relaxations have been introduced in several items, including steelworks plant, certain electronic equipment and transistors. At the same time, the embargo now includes some narrow ranges of specialized strategic equipment not hitherto covered.

In response to an invitation from the Government of the United Arab Republic, a small party of British businessmen and industrialists is going to Cairo on February 23 under the auspices of the Advisory Council on Middle East Trade and the Federation of British Industries. The purpose of the mission will be to renew trading contacts and to examine the prospects of increasing trade in both directions between the United Kingdom and the UAR. The leader of the party will be the Hon. George Nelson, managing director of the English Electric Company, Limited, and industrial leader and vice-chairman of ACMET.

ACCORDING TO A PRESS RELEASE about the forthcoming American Foundrymen's Society Exhibition to be held in Philadelphia, the foundries of that country will need over £177,000,000 worth of equipment during the next two years. They are expected to spend £240,000,000 for materials, supplies and services in producing an estimated output of 37,600,000 short tons of castings in 1960 and 1961. These figures cater for an average increase in production of 15 per cent. in 1960 and 20 per cent. in 1961. The non-ferrous foundries expect a larger increase in output (16.4 per cent.) in 1960 than the ferrous founders (14 per cent.).

IT WAS RECENTLY ANNOUNCED in the JOURNAL that Guest Keen & Nettlefolds (Cwmbran), Limited, were installing a large malleable-iron foundry. It is now learnt that Foundry Equipment, Limited, of Leighton Buzzard, have received the contract for the supply of the whole of the mechanized plant to include the shake-out, sand return, storage, sand-milling and distribution plant, moulding machines, mould conveyor, core-shop, fettling shop, dust and fume extraction plant, overhead castings conveyor and various other mechanical-handling items. The melting plant and annealing furnaces are being furnished by other manufacturers.

AT THE MEETING of the Lincoln Engineering Society on February 5, a presentation was made to Alderman Sir Francis Hill, who has resigned after being secretary of the Society since its formation in 1923. It was reported at the meeting that although there had been 44 successful applications for membership in the past year, the present total of 306, with 59 graduates, is lower than 12 months ago. Officers elected were: As president, Mr. F. E. Walker; senior vice-president, Mr. J. H. Page; junior vice-president, Mr. S. Mawer; honorary treasurer, Mr. A. W. Torn; and as secretary, Mr. L. F. Wilson. Mr. F. E. Walker addressed the meeting on "Industrial Evolution."

A NUMBER OF EMPLOYEES who have completed 25 years' service with the National Steel Foundry (1914), Limited, Kirkland Works, Leven, Fife, have joined 80 of their colleagues who wear the special badge struck by the foundry to mark their service, and have been welcomed to the firm's "25 Club." They were also entertained to luncheon by the managing director Mr. C. H. Kain, and members of the board. A director, Mr. S. B. Perry, was amongst those who received an award. Others were: foreman, Mr. A. K. Dunsire; cranesman, Mr. D. Houston; turner, Mr. J. McBride; castings inspector, Mr. J. Rintoull; dresser, Mr. W. Millar; furnaceman, Mr. D. Marshall; moulder, Mr. H. Marshall; inspectors, Mr. J. Galloway and Mr. C. Lindsay.

Recent Wills

HALL, WILLIAM, former foundry manager at the Eccles-field works of the Brightside Foundry & Engineering Company, Limited, Sheffield ... £10,33

HOLMES, CHARLES, connected with the steel industry in Sheffield for more than 50 years and late manager of Thos. Firth & John Brown, Limited £7,72

PARKINSON, G. H., sales director of Ley's Malleable Castings Company, Limited, Derby, and a director of its associate company, the Ewart Chainbelt Company, Limited £60,16

WILSON, H. G. C., chairman and managing director of John Harris Tools, Limited, Warwick, and a vice-chairman and former treasurer of the Gauge and Tool Makers' Association £83,70

CHAMBERLAIN, W. E., chairman and managing director of the Chamberlain group of companies, which serves civil engineering and allied fields and which includes Chamberlain Industries, Limited, mechanical engineers, makers of cranes, etc., of London, E.10 ... ... £183,93

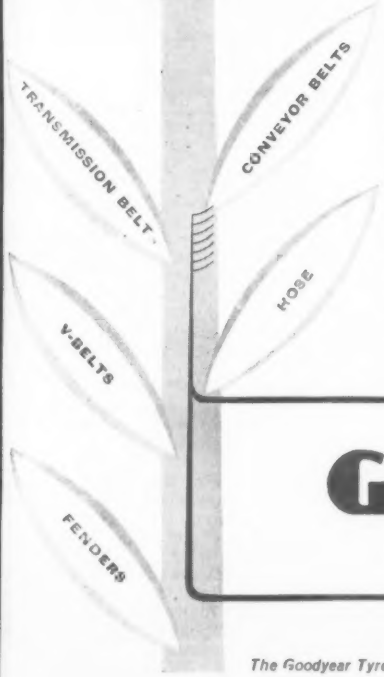
TIZARD, SIR HENRY THOMAS, F.R.S., principal scientific adviser to the Government, 1946-52, chairman of the Advisory Council on Scientific Policy and the Defence Research Policy Committee, and a director of Albright & Wilson, Limited, industrial chemical manufacturers, of Oldbury (Staffs), Blaw Knox, Limited, makers of steelworks and furnace plant and equipment, of London, S.W.5 £31,63

Obituary

Mr. F. A. STAPLETON, a former head of a work department of Loughborough College, Leicestershire, has died at the age of 71. He joined the staff of the college in 1918, and was one of the pioneers responsible for its development.

From the Goodyear family tree

BELTING THAT TAKES A LOT OF BEATING



Whatever material you want to move, whatever the conditions, you'll find the conveyor belt for the job in the Goodyear family tree! For abrasive coke or hot sinter . . . oily materials or sharp stone . . . food and coal . . . a 'job-designed' Goodyear belt is your best choice for longest, low-cost performance. Special features include: good troughing, high impact resistance and flex life, and resistance to mildew. Get in touch with Goodyear now for Britain's most comprehensive conveyor belt service.

* Tough cover compounded to suit job
* Breaker fabric between cover and carcass—where required
* Plies of close-woven cotton duck, or synthetic fibres, mildew inhibited
* Skim coat between plies to increase flexibility, prevent separation
* Substantial edge cover to resist wear

GOODYEAR

THE GREATEST NAME IN RUBBER

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Raw Material Markets

Iron and Steel

Reduced maximum prices for some iron and steel products were introduced by the Iron and Steel Board on Monday. Hematite pig-iron is down by 15s. a ton, and the extras relating to basic pig-iron are amended. The reductions in steel products are:—Heavy steel plates, 10s. a ton; heavy sections and joists, £1; tinplate (according to specification), on average £1. The increase averaging 8s. a ton of tinplate which would otherwise become due on April 1 following the recent rise in tin prices will not be applied. Previous reductions were made in March, 1958, and June, 1959, and the combined effect of the three reductions is an overall reduction of 2½ to 3 per cent. in the general level of steel prices.

Since last June, when the prices of most iron and steel products were reduced, the costs of ore, scrap, fuel, transport, and labour have remained broadly unchanged. But the rising demand for steel has led to the use of a higher proportion of pig-iron in relation to scrap in steelmaking and, as pig-iron is the more expensive material, there has been a rise in production costs. Against this, the board states, experience has shown that modern plants are capable of greater outputs than were previously assumed. In consequence, the capital cost per ton of output is lower. It is estimated that this has rather more than offset the higher production costs and has thus enabled certain prices to be reduced.

The revised prices are incorporated in the Price List on page 188.

Expansion in the demand for all grades of pig-iron continues, but home producers are able to cope satisfactorily with the position. With ingot steel outputs running at record levels, there is a much bigger demand for basic pig-iron, which is being met by increased outputs from existing furnaces and the blowing-in of fresh units, and there is still additional capacity which could be utilized should the need arise.

The increased call from the ironfoundries for pig-iron in all grades is also being fully implemented, and apart from the inability of some of the engineering foundries to obtain their full requirements in certain brands of the low-phosphorus iron, the overall production of pig-iron is adequate for both consumption and stock requirements.

The production of high-quality castings by the engineering and speciality foundries continues much bigger comparatively than for other types of castings, and their present outputs are absorbing substantial quantities of pig-iron, the low-phosphorus grade being the most widely used, while large tonnages of hematite and also—but to a much lesser extent—the refined irons are being utilized in their mixtures. The foundries have now a much wider range of supply of the low-phosphorus irons from the several furnaces now producing this grade. Outputs from those units which have recently been burdened for this iron will increase and, with the larger tonnages which it is expected will be obtained from two new furnaces which will go into production shortly, the supply of this grade of pig-iron should show further improvement. Hematite producers are much busier due to the larger tonnages now being taken up by the steelworks and the foundries and the stocks held by them have been reduced considerably. The present demand for castings from the engineering and speciality foundries keeps most of them well occupied; those supplying castings to the motor vehicle trade are very busy, and the machine-tool industry also continues to specify more freely.

The makers of high-phosphorus pig-iron continue to receive reasonably good demands from the light, jobbing, textile, and some of the engineering foundries.

Most of the re-rollers are working as fully as the labour situation allows and order-books ensure outputs at recent levels for some time ahead. Orders for small bars, light sections, and reinforcing rods continue to be received for substantial tonnages, and these commitments call for large tonnages of steel semis. Home steelworks are supplying all available quantities, which in many instances fall short of requirements, as the re-rollers have meagre stocks available and depend almost entirely on current deliveries for their rollings.

Non-ferrous Metals

The news reached London on Monday that the Phelps Dodge Corporation and negotiators for the Mine, Mill and Smelter Workers' Union had agreed at Douglas, Arizona, on a 29-month contract. Under the agreement, pay and other benefits are raised 33.2 cents an hour. The agreement is subject to ratification by the union membership. There was no indication, however, of any scheduled meeting between the company and the Steel Workers' Union, which has been striking at the Phelps Dodge Laurel Hill, New York, copper refinery since August 1.

Demand for copper is good from the UK and from western Germany, and eastern European countries are also coming into the market. In addition, further import licences have been granted to Japanese importers and, with stocks in LME warehouses standing at only 3,822 tons—a fall of 550 tons on the week—prices are firm. The outlook is still governed by the US situation. In the US demand is good. Outrageous prices have disappeared, although metal for immediate delivery commands a fair premium over the established prices of 35 cents for custom smelter metal and 33 cents a pound for producers' material. However, the price for No. 2 scrap has fallen to 25½ cents a pound, a move which would indicate that lower prices for refined metal are likely in the June quarter of this year.

Tin is holding its price remarkably well. The market is quietly steady in London and satisfactory demand prevails both in the East and in New York, where the quotation has moved up to around $1.01 a pound.

The communiqué covering the Lead-Zinc Conference in Geneva became available towards the end of last week. In general terms the findings were that at present production/consumption levels there would be a deficit this year of zinc in the region of 75,000 tons and a surplus of lead of the order of 100,000 tons. It was, therefore, recommended that restrictions on the production of zinc should be lifted and those on lead retained. In this latter connection, producers were quite willing to limit the tonnage of lead finding its way to the market so that the excess is reduced to 50,000 tons and to keep the present restrictions in force for the next nine months. It was also noted that US stocks of "Prime Western" zinc are substantially above normal working levels and that the UK Government proposes to liquidate its stockpile of 54,000 *tonnes* on the market over the next four years.

In these circumstances, zinc has been a shaky market in London, as observers feel that with increased production and the continual disposal of the UK stockpile more metal will be available than is required. The US market is quiet.

Lead is drifting in London as no one is as yet quite prepared to take a view as to how far and to what extent prices will react if the forecast of a 100,000-ton surplus is correct. The US market is also quiet, with the price still called 12 cents a pound.

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COKE OVEN DOOR LININGS
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(An iron-free white calcium-aluminate cement)
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Super Duty and Special Conditions of:
Higher temperatures up to 1800°C
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AP81

Imports and Exports of Iron and Steel in December

The following tables, based on Board of Trade returns, give figures of imports and exports of iron and steel in December, 1959. Totals for 1959 and the previous year are also included.

Total Exports of Iron and Steel

Destination.	Month ended Dec. 31.	Year ended December 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Cyprus	160	5,131	1,684
Sierra Leone	426	11,789	9,132
Ghana	2,087	15,702	25,943
Nigeria	6,668	73,161	74,534
Union of South Africa	5,790	104,654	43,946
Rhodesia and Nyasaland	1,918	32,230	21,283
Tanganyika	1,486	20,006	19,264
Kenya	2,402	41,377	26,188
Uganda	185	3,380	4,090
Mauritius	198	3,749	1,792
Aden	230	2,779	3,063
Bahrein, Qatar, and Trucial States	1,688	9,415	9,417
Kuwait	215	41,125	9,730
India	19,004	179,362	210,743
Pakistan	7,422	53,800	48,528
Singapore	818	32,748	21,674
Malaya	1,421	15,630	10,944
Ceylon	1,868	30,094	36,138
British North Borneo	421	2,311	2,931
Hongkong	6,319	59,336	68,432
Australia	8,167	107,580	86,937
New Zealand	9,136	188,634	103,463
Canada	15,390	189,239	230,098
Jamaica	2,314	22,409	22,223
Trinidad	2,502	50,557	39,562
British Guiana	576	6,788	6,661
Other Commonwealth countries	2,658	51,498	36,626
Eire	5,926	49,200	51,230
Soviet Union	3,589	21,936	33,302
Finland	4,166	49,486	38,551
Sweden	16,935	125,457	134,560
Norway	10,948	91,738	100,230
Denmark	9,182	83,828	96,470
Western Germany	25,596	62,519	133,632
Netherlands	12,931	81,868	106,162
Belgium	6,762	38,191	39,844
France	800	4,325	6,085
Switzerland	981	9,022	8,863
Portugal	952	15,278	14,819
Spain	865	41,440	25,565
Italy	3,761	40,734	46,364
Austria	245	9,059	4,505
Yugoslavia	547	4,642	5,715
Greece	1,143	12,810	11,107
Turkey	695	4,012	5,441
Netherlands Antilles	192	2,205	3,283
Portuguese East Africa	317	2,585	1,685
Egypt	1,022	12,692	7,170
Sudan	1,186	32,369	7,694
Lebanon	178	8,701	4,069
Israel	1,585	9,044	14,359
Saudi Arabia	219	3,771	3,219
Iraq	1,208	41,373	74,292
Iran	2,508	38,178	38,591
Burma	656	11,909	8,720
Thailand	545	6,769	7,920
Indonesia	1,702	2,273	10,017
Philippine Republic	251	3,573	8,390
USA	27,659	87,352	208,254
Cuba	1,429	6,731	8,836
Colombia	1,019	5,239	5,918
Venezuela	2,865	73,066	64,325
Ecuador	148	2,298	1,040
Peru	330	9,902	3,055
Chile	184	4,888	1,547
Uruguay	1,699	920	3,444
Argentina	10,189	155,592	194,703
Other foreign countries	60,364	154,104	389,945
TOTAL	324,948	2,775,563	3,107,947

Total Imports of Iron and Steel

From	Month ended Dec. 31.	Year ended December 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Rhodesia and Nyasaland	499	6,183	5,383
Canada	4,648	22,667	22,791
Other Commonwealth countries and Eire	4,410	23,145	42,930
Soviet Union	12,064	108,935	66,745
Sweden	2,986	34,289	30,826
Norway	9,874	70,388	91,233
Poland	880	319	5,553
Western Germany	8,696	64,881	78,884
Netherlands	14,037	147,486	165,037
Belgium	2,581	88,586	23,056
Luxembourg	1,261	6,097	7,484
France	4,123	18,934	26,152
Italy	1,176	7,885	13,510
Austria	759	3,842	4,537
Japan	510	3,883	2,747
USA	3,553	115,435	26,837
Other foreign countries	2,264	8,041	13,613
TOTAL	74,321	729,996	627,318
Iron and steel scrap and waste, fit only for the recovery of metal	69	64,142	2,746

Exports of Iron and Steel by Products

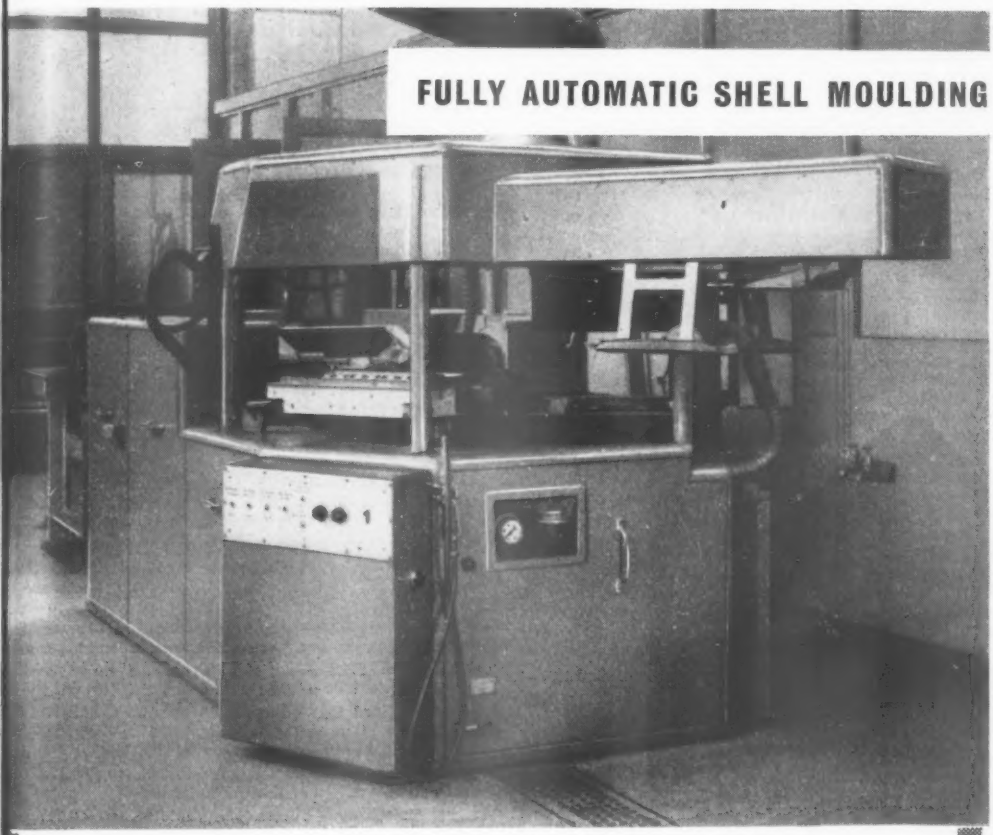
Product.	Month ended, Dec. 31.	Year ended December 31.	
	1959.	1958.	1959.
	Tons.	Tons.	Tons.
Pig-iron	32,076	151,687	157,884
Ferro-columbium (niobium)	9	37	71
Ferro-tungsten	100	993	1,250
Other ferro-alloys	454	3,417	9,469
Ingots, blooms, billets, slabs, sheet bars (incl. tinplate bars), and similar primary forms	9,794	21,746	82,669
Pieces roughly shaped by forging*	131	7,149	1,429
Iron bars, rods, angles, shapes, and sections	130	1,673	2,869
Steel bars, rods, angles, sections, and shapes	66,123	334,605	543,337
Iron plates and sheets	28	1,826	1,670
Universal plates	339	4,326	8,177
Steel plate, 3mm. and under 4.5mm. thickness	2,956	9,987	40,000
Ditto, 4.5mm. or more in thickness	30,096	172,614	228,297
Blacksheets and blackplate	27,730	295,258	287,810
Hoop and strip	8,031	80,512	83,923
Tinplate	44,959	414,013	468,065
Decorated tinplate	502	6,972	8,131
Galvanized sheets	8,902	87,472	85,683
Other (incl. tinned sheets, terneplate, and ternesheets)	2,982	13,592	22,037
Railway and tramway construction material	11,290	272,338	164,845
Wire rods of steel (incl. alloy steel)	3,989	49,034	49,412
Wire	9,484	102,462	109,422
Tubes, pipes, and fittings	64,843	743,850	751,567
TOTAL	324,948	2,775,563	3,107,947

* The figures for 1959 are not completely comparable with those for previous years.

ARMSTRONG WHITWORTH (METAL INDUSTRIES), LIMITED, have been granted a licence for the manufacture and sale throughout the world, with the exception of the Americas and New Zealand, of the American Overstrom vibrating screens.

A FEATURE of South Africa's industrial development is the increasing use of aluminium. To-day the Union and the Federation consume roughly 12,000 tons per annum; in 1945 the total import figure was 350 tons.

FULLY AUTOMATIC SHELL MOULDING



Production rate 75 shells per hour

The new Baker Perkins Shell Moulding Machine is fully automatic in its operation. The sand/resin mixture supplied to the storage hopper is automatically fed to the machine. The finished shells are automatically removed from the ejection station, and from there if required to a suitable conveyor.

Short runs are entirely practicable, pattern changing being simple and quick, taking only five minutes and effected single-handed.

On production, shells 18" x 12" weighing 4 to 4½ lbs. are produced at the rate of 75 per hour maximum.

Baker Perkins SHELL MOULDING MACHINES

For further details, please write to:

Baker Perkins Ltd.

Engineers

BEDEWELL DIVISION · HEBBURN-ON-TYNE · Co DURHAM

PHONE: JARROW 897124

BP/F8

Current Prices of Iron, Steel, and Non-ferrous Metals

(Delivered unless otherwise stated)

February 10, 1960

PIG-IRON

Foundry Iron.—No. 3 IRON, CLASS 2, 10-ton lots or over: Middlesbrough, £21 6s. 0d.; Birmingham, £20 18s. 3d.

Low-phosphorus Iron.—Over 0.10 to 0.40 per cent. P, 10-ton lots or over, £23 5s. 0d., delivered Birmingham, £23 10s. 0d., delivered Grangemouth.

Cylinder and Refined Irons.—North Zone, £25 6s. 6d.; South Zone, £25 9s. 0d.

Refined Malleable.—P, 0.10 per cent. max.: North Zone, £26 6s. 6d.; South Zone, £26 9s. 0d.

Hematite.—Si up to 2 per cent., S. & P. over 0.03 to 0.05 per cent., 10-ton lots or over: N.-E. of England (local iron), £23 19s. 0d.; Scotland (Scotch iron), Zone S.1, £24 5s. 6d.; Sheffield, £25 7s. 6d.; Birmingham, £25 14s. 0d.; Wales (Welsh iron), £23 19s. 0d.

Basic Pig-iron.—£20 3s. 0d., delivered Staffs, Derbyshire, Notts, Lincs, Rutland, Northants, and Leicestershire in 10-ton lots or over.

FERRO-ALLOYS

(Per ton unless otherwise stated, delivered)

Ferro-silicon (6-ton lots and over).—45 per cent. Si, £41 10s. 0d. to £44 0s. 0d., scale 15s. 0d. per unit, lumpy; 75 per cent. Si, £57 0s. 0d. to £62 10s. 0d., scale 15s. 0d. per unit, lumpy.

Ferro-vanadium.—50/60 per cent., 22s. 6d. per lb. of V.

Ferro-molybdenum.—65/70 per cent., carbon-free, 12s. 10d. per lb. of Mo.

Ferro-titanium.—20/25 per cent., 2-3 per cent. Cu, £250 0s. 0d.; 38/40 per cent., commercially carbon-free, £287 0s. 0d.

Ferro-tungsten.—80/85 per cent., 12s. 0d. per lb. of W.

Tungsten Metal Powder.—98/99 per cent., 15s. 0d. per lb. of W.

Ferro-chrome (6-ton lots and over, lumpy).—4/6 per cent. C, £78 10s. 0d. to £82 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; over 6 per cent. C, £77 0s 0d. to £80 10s. 0d., basis 60 per cent. Cr, scale 26s. 0d. to 28s. 6d. per unit; 2 per cent. C,* 1s. 8d. to 1s. 11d. per lb. Cr; 1 per cent, C,* 1s. 8¼d. to 1s. 11¼d. per lb. Cr; 0.15 per cent. C,* 1s. 9¼d. to 2s. 0¼d. per lb. Cr; 0.10 per cent. C,* 1s. 9¾d. to 2s. 0¾d. per lb. Cr; 0.06 per cent. C,* 1s. 10¼d. to 2s. 1d. per lb. Cr.

Metallic Chromium.—98/99 per cent., 6s. 10d. per lb.

Metallic Manganese.—94/96 per cent., carbon-free, 96/98 per cent., £285 0s. 0d.

Ferro-columbium.—65/67 per cent., Cb + Ta, 19s. 9d. per lb., Cb + Ta.

Ferro-manganese (Standard).—78 per cent., £63 10s. 0d.

SEMI-FINISHED STEEL

Re-rolling Billets, Blooms, and Slabs.—BASIC: Soft u.t., 100 tons & over, £31 15s. 6d.; tested, 0.08 to 0.33 per cent. C, 6 to 35 tons, £33 15s. 6d.; hard (0.41 to 0.60 per cent. C), under 10 tons, £34 17s. 0d.; silico-manganese, under 10 tons, £43 16s. 6d.; free-cutting, under 10 tons, £36 14s. 6d. SIEMENS MARTIN ACID (under 10 tons): Up to 0.25 per cent. C, £41 1s. 0d.; silico-manganese. £44 4s. 0d

Billets, Blooms, and Slabs for Forging and for Stamping (under 10 tons).—Basic, soft, up to 0.33 per cent. C, £38 10s. 0d.; basic, hard, over 0.41 up to 0.60 per cent. C, £39 12s. 6d.; acid, up to 0.25 per cent. C, £43 4s. 0d.

FINISHED STEEL

Heavy Plates and Sections (1 ton to 10 tons).—Ship plates, (N.-E. Coast), £41 12s. 0d.; boiler plates (N.-E. Coast), £44 2s. 0d.; floor plates (N.-E. Coast), £43 10s. 0d.; angles (N.-E. Coast), £38 16s. 6d.; joists (N.-E. Coast), £38 12s. 6d.

Small Bars, Sheets, etc.—Rounds and squares, under 3 in., and flats 5 in. wide and under, untested soft basic, 50 tons and over, £39 1s. 0d.; under 10 tons to 4 tons, £40 18s. 0d.; under 4 tons to 2 tons, £41 3s. 0d.; hoop and strip, coils, 100 tons and over, £38 0s. 0d.; uncoated strip mill coils, hot rolled, under 3 mm. to 12g., 25 tons to under 50 tons, £43 16s. 0d.; black sheets (hand mill), 24g., 10 tons and over, £57 14s. 6d.; galvanized corrugated sheets, 24g., 10 tons and over, £68 5s. 0d.

Alloy Steel Bars.—1 in. dia. and up: Nickel, £68 10s. 0d., nickel-chrome, £99 4s. 0d.; nickel chrome-molybdenum £111 17s. 0d., in lots of 5 tons to under 10 tons.

NON-FERROUS METALS

Copper.—Cash, £274 0s. 0d. to £275 0s. 0d.; three months, £247 10s. 0d. to £248 0s. 0d.; settlement, £275 0s. 0d.

Copper Tubes, etc.—Solid-drawn tubes, 2s. 6½d. per lb.; rods, 280s. 0d. per cwt. basis; 20 s.w.g., 315s. 0d. per cwt.

Tin.—Cash, £792 0s. 0d. to £793 0s. 0d.; three months, £789 0s. 0d. to £790 0s. 0d.; settlement, £793 0s. 0d.

Lead (Refined Pig).—First half February, £71 17s. 6d. to £72 0s. 0d.; first half May, £72 5s. 6d. to £72 7s. 6d.

Zinc.—First half February, £89 15s. 0d. to £89 17s. 6d.; first half May, £89 17s. 6d. to £90 0s. 0d.

Zinc Sheets, etc.—Sheets, 15g. and thicker, all English destinations, £124 12s. 6d.; rolled zinc (boiler plates), all English destinations, £122 7s. 6d.; zinc oxide (Red Seal), d/d buyers' premises, £105 0s. 0d.

Brass Tubes, etc.—Solid-drawn tubes, 2s. 1d. per lb.; sheets to 10 w.g., 224s. 3d. per cwt.; wire, 2s. 10½d.; rolled metal, 223s. 9d. per cwt.

Brass (Brazing).—BS1400, B3, £174; B6, £229.

Brass (High Tensile).—BS1400, HTB1, £206; HTB2, £222; HTB3, £236.

Gunmetal.—BS1400, LG2, £221; LG3, £230; G1, ½%, £290; G1, 1%, £277.

Phosphor Bronze.—BS1400, PB1 (AID released), £325; BS1400, 90/10/1, £304.

Leaded Phosphor Bronze.—BS1400, LPB1, £238.

Phosphor Bronze Strip, etc.—Strip, 319s. 9d. per cwt.; wire, 4s. 4¾d. per lb.; rods, 3s. 7¼d.; tubes, 3s. 7¼d.; chill cast bars; solids 3s. 6¾d.; cored 3s. 7¾d. (CHARLES CLIFFORD, LIMITED.)

Nickel Silver, etc.—Rolled metal, 3 in. to 9 in. wide × 0.056, 4s. 1¼d. per lb.; round wire, 10g in coils (10 per cent.), 4s. 6¼d.; special quality turning rod, 10 per cent. ½ in. dia., in straight lengths, 4s. 5¼d. All prices are net.

Other Metals.—Magnesium, ingots, 2s. 0d. to 2s. 3d. per lb. Antimony, English, 99 per cent., £190 0s. 0d. Quicksilver, ex-warehouse, £71 10s. 0d. Nickel, £600 0s. 0d. Aluminium, ingots, £186 0s. 0d.; aluminium bronze (BS1400), AB1, £271; AB2, £280.

* Average 68–70 per cent.

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FOR WOOD OR METAL PATTERNS

"PLASTIFIL" PATENT WAX FILLET

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"POLYFIL" PATENT PLASTIC FILLET FOR METAL OR WOOD PATTERNS

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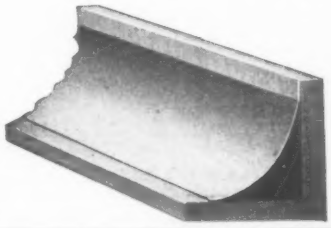

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POMEROY ST., NEW CROSS, LONDON, S.E.14.

PIG IRON, All Grades

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CLASSIFIED ADVERTISEMENTS

PREPAID RATES: Fifteen words for 7/6 (minimum charge) and 4d. per word thereafter. Box Numbers 2/6 extra (including postage of replies). Situations wanted 2d. per word throughout.

Advertisements (accompanied by a remittance) and replies to Box Numbers should be addressed to the Advertisement Manager, Foundry Trade Journal, John Adam House 17/19, John Adam Street, Adelphi, London, W.C.2. If received by first post Monday advertisements can normally be accommodated in the following Thursday's issue.

SITUATIONS WANTED

FOUNDRYMAN, 24, with a good all-round foundry training in cast iron jobbing (40 tons), holder of the National Foundry College Diploma, seeks position of responsibility, production or technical, with good prospects. Box FO375, FOUNDRY TRADE JOURNAL.

FOUNDRY ESTIMATOR, 32, Pattern-maker with eight years' experience of planning and estimating for small and medium size castings, requires progressive position.—Box FE387, FOUNDRY TRADE JOURNAL.

DRAUGHTSMAN — engineering and foundry training, accustomed to the planning and commission of foundry plant. Position desired Methods/Development.—Box DE 388, FOUNDRY TRADE JOURNAL.

METALLURGIST requires position. Managerial, Metallurgical/Technical Control. A.M.I.B.F., City and Guilds. Experienced Cupola, Electric Furnace control, Sand control, Analysis, etc. Box MR398, FOUNDRY TRADE JOURNAL.

EXPERIENCED, QUALIFIED
FOUNDRYMAN METALLURGIST TECHNICIAN

Wide experience. Age 34.
Invites opportunity with firm of repute. MECHANICAL HANDLING, FOUNDRY PLANT, CONSULTANTS, FOUNDRY SALES, etc., to establish self in permanent progressive position. Brief details to Box EQ400, FOUNDRY TRADE JOURNAL.

PRACTICAL FOUNDRYMAN, age 39, M.I.B.F., C. & G., returning U.K. April, seeks post, MANAGER/ASSISTANT MANAGER. Wide experience grey iron and non-ferrous castings. Fourteen years' executive experience U.K. and overseas. Excellent references. Box PF404, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT

PATTERNMAKERS—Wood and Metal—required. Coventry area. High rates, bonus, ideal conditions. Box PW341, FOUNDRY TRADE JOURNAL.

ASSISTANT CHEMIST, aged 21-28, required for the Laboratory of an Aluminium Die Casting Shop situated on the South Coast. Please apply in writing, giving full details, to WELLWORTHY LTD., Ampress Works, Lymington, Hants.

MOULDERS skilled floor. Preferably experienced aluminium—good piecework—wanted by firm with heavy order book. Club and canteen facilities. Apply LIGHTALLOYS, LTD., St. Leonards Road, Willesden Junction, Elgar 7191.

S. WALES Aluminium Foundry require SAND FOUNDRY SUPERINTENDENT for Non-ferrous Aluminium work to cover Aircraft-type Castings. X-rayed in high grade alloys. Box SW368, FOUNDRY TRADE JOURNAL.

SHELL MOULDING (Iron).—CHARGE HAND, experienced, to take charge of Shell Moulding Plant. West Bromwich area. Capable of handling Male and Female Labour. State age, experience and wages to Box CH397, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

A FOUNDRY TECHNICIAN is required to help with the work of a small experimental foundry at this Polytechnic.

His duties will include the supervision of crucible and cupola smelting, the moulding and casting of small castings and the use of sand testing equipment. He will also be required to carry out necessary maintenance work.

Applicants should possess a City and Guilds of London Institute certificate in foundry practice and have had some industrial experience.

His salary will be £265 at 16 years of age rising to a maximum of £580 per annum (with additional increments for qualification).

Applications should be addressed as soon as possible to the Secretary, BOROUGH POLYTECHNIC, Borough Road, S.E.1.

EXPERIENCED IRON FOUNDRY FOREMAN required, age 30-40 years; to take full charge of progressive foundry in Rochdale district employing 20 moulders engaged mainly on floor moulding of castings up to 8 tons. Applicants should be familiar with British Standard Specifications and capable of exercising control of personnel. This is a staff appointment and the successful applicant must be prepared to join the Company's Contributory Pension Scheme.—Applications stating previous experience and salary required, addressed to Box EX390, FOUNDRY TRADE JOURNAL.

APPLICATIONS are invited for the position of FOUNDRY SUPERINTENDENT with a leading North Midlands Engineering Company. Applicants should have a first-class technical ability and practical knowledge of all aspects of High Grade Iron Foundry production. Initiative and executive ability essential. Superannuation scheme available and assistance will be given with housing. Excellent prospects for the right man but only first-class foundrymen with good knowledge of Shop Management should apply. —Box AA394, FOUNDRY TRADE JOURNAL.

HAVING been appointed sole agents in the Midlands for a prominent Refractories Group we wish to engage a first-class Refractories representative. Ideally applicants should have an existing connection and sound technical knowledge of Firebricks and their applications, but suitable candidates fulfilling one or other of these requirements will be considered. Remuneration will be realistic and a car will be provided. The position offered constitutes a first-class opportunity to join a progressive and enterprising organisation.—Apply to ALEXANDER COMLEY (FOUNDRY DIVISION), LTD., Gazette Buildings, 168, Corporation Street, Birmingham, 4.

FOUNDRY ADMINISTRATOR required by Light Engineering Group of Companies to take over the commercial control of an expanding light alloy foundry. It is essential that the applicant should have had wide experience in the organisation, methods and piecework systems in the light alloy foundry field. This is a senior appointment and accommodation will be provided if required.—Full particulars in the strictest confidence to General Manager, Box FA389, FOUNDRY TRADE JOURNAL.

SITUATIONS VACANT—*contd.*

SALES REPRESENTATIVE required by progressive Foundry in North-East England. Expanding capacity for Iron and Non-ferrous Castings and Pattern making. Box SR373, FOUNDRY TRADE JOURNAL.

FOUNDRY FOREMAN required. Experienced practical man accustomed to handling labour and all aspects of jobbing and semi-mechanized production. Probable assistance with housing after probationary period. Situation N.W. London. Box FF370, FOUNDRY TRADE JOURNAL.

HAND MOULDER required for small jobbing foundry. Experience of non-ferrous metals essential. Good wages and conditions.—Apply to PERSONNEL DEPARTMENT, E.M.I., LTD., Blyth Road, Hayes, Middlesex.

EXPERIENCED ESTIMATOR required for Foundry and Pattern Shop work. Some knowledge of Machine Shop estimating would also be beneficial but not essential. Reply giving details of experience and qualifications. State salary required. H. C. HOPPER (NORWICH), LTD., "Norfolk Iron Works," Coslany Street, Norwich, Norfolk. NOR. 82K.

WORKS MANAGER required by Manchester Firm of Ingot Makers. Knowledge of Non-ferrous Ingot Manufacture and General Management essential. Pension Scheme and car. Write giving full details of qualifications and experience to Box WM383, FOUNDRY TRADE JOURNAL.

SENIOR FOUNDRY METALLURGIST required. Sound experience in High Duty Irons and Cupola control essential. Must also have practical experience in Sand Control and production of White Heart Malleable. Knowledge of Aluminium, Copper and Yellow Metals would be an advantage. Experience in A.I.D. requirements would also be in applicant's favour. Reply, in confidence, by letter only, stating age, experience and salary required, to: ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED, Hill Top Foundry, Smith Road, Wednesbury, Staffs.

PRACTICAL FOUNDRY MANAGER required for Grey Iron Jobbing Foundry in North Manchester area. Weekly production 6 tons. State age and experience. Box PF369, FOUNDRY TRADE JOURNAL.

STRUCTURAL and mechanical senior and junior draughtsmen required for design and construction of foundry equipment and furnaces. These are permanent staff posts with excellent prospects. Five-day week. Pension Scheme. Canteen.—Apply EFCO, LTD., 161, Queens Road, Weybridge, Surrey.

FOUNDRY CHARGEHAND. Expanding aluminium foundry requires working Chargehand Moulder. Excellent opportunity for a man with initiative. Apply, giving details of age, experience, married or single, wages required, to: STANFRICO FOUNDRY, LIMITED, Oak Yard, Halstead, Essex.

SITUATIONS VACANT—*contd.*

PATTERN MAKERS, Wood and Metal. Master Shop experience. Good prospects and conditions; top rates. West London area. Box PM399, FOUNDRY TRADE JOURNAL.

STEEL FOUNDRY MANAGER

BROWN, LENOX & CO. LTD., require a MANAGER for their Steel Foundry at Pontypridd.

Applicants must be experienced in the manufacture of Carbon and Medium Alloy Steel Castings up to 3 tons in weight, and in all aspects of foundry management.

Age 40-45. Pension Scheme. House Available.

Apply with full particulars to the Managing Director,

BROWN, LENOX & CO. LTD., Pontypridd, Glamorgan.

FOREMAN required for Master Pattern-shop, must be experienced on wood and metal equipment. Good salary and prospects for suitable applicant with previous supervisory experience.—Replies in confidence to J. J. HARVEY & PRESSURE, LTD., Lime Bank Street, Ardwick, Manchester, 12.

JUNIOR LABORATORY ASSISTANT required, used to analysis of cast iron. State experience and salary required. North Staffs area.—Box JL391, FOUNDRY TRADE JOURNAL.

FOUNDRY PLANT ENGINEER

A NEW post has arisen for an energetic Engineer capable of developing and installing a mechanised foundry plant. Applicant must have sound knowledge of foundry plant. The position is very progressive and offers excellent opportunities.—Please reply in writing stating age, experience, and salary required, to TIPTON FOUNDRY, LTD., Britannia Street, Tividale, Tipton, Staffs.

METALLURGIST required to take charge of small Physical and Chemical Laboratory, principally engaged on Aluminium Alloys but some Steel Heat-treatment control experience preferable. I.D. approved would be an added advantage. Excellent conditions and scope, aged 25-40. Please write stating salary required and giving full details of experience to the WORKS MANAGER, Wellworthy Ltd., Ampress Works, Lymington, Hants.

SUPERVISOR required for Cupola Melting Plant. Must be interested in modern developments and preferably of N.C. standard at least. Pleasant conditions, Pension Scheme, etc. Salary by arrangement. Full details to SECRETARY, The North Eastern Iron Refining Co., Ltd., Billington, Stockton-on-Tees.

FOUNDRY TECHNICIAN required to assist Manager of a 60-ton per week Grey Iron Foundry. Interesting and varied work with good prospects. Send details of education, experience, age and salary required to Box FT402, FOUNDRY TRADE JOURNAL.

ROUTINE ANALYST, age 40/45, required for analysis of cast iron, steel and non-ferrous metals. Knowledge of foundry materials preferred. Capable of working without supervision. Manchester area. Good salary, Pension Scheme, fifteen. Box RA401, FOUNDRY TRADE JOURNAL.

AGENCIES

REPRESENTATIVES REQUIRED

LIVE AGENTS required in several industrial areas in United Kingdom, calling on Foundries, Boiler Houses, etc., to sell Refractories. Right men can earn over £2,500 per annum. Write to: CORROSION LIMITED, Malvern Road, Southampton.

SMALL iron foundry, grey iron, wishing to expand, requires agent to sell on commission basis.—Full particulars to Box SM393, FOUNDRY TRADE JOURNAL.

AMALGAMATION

PROGRESSIVE FOUNDRY seeks amalgamation with similar view to increasing efficiency. Or, would consider renting large foundry premises in North-West area.—Box PF392, FOUNDRY TRADE JOURNAL.

BUSINESS FOR SALE

ADVERTISER approaching retirement, owner of small Ironfoundry near Manchester, old established with excellent profit record, invites offers of purchase or other suggestions. Replies will be treated in strict confidence. Box AA380, FOUNDRY TRADE JOURNAL.

MACHINERY WANTED

WANTED. Cumming Hand Roll-over Moulding Machine. Price and details to ENGINEERING CASTINGS (WORCESTER) LIMITED, Newton Road, Worcester.

POWERFUL Briquetting Machine for fine metal Swarf, capable of producing briquettes weighing about 10 lbs. WILLIAM E. DUNN, LIMITED, P.O. Box 24, Wednesbury.

LADLE, 15-ton top pouring, in good condition, Iron Foundry. Box LA403, FOUNDRY TRADE JOURNAL.

HIGH FREQUENCY Furnace, approximately 20 lbs. steel capacity; generating equipment not required. DAVID BUDWORTH, LTD., Harwich, Essex.

FORCED Air Circulation Furnace, 20-40 kW., 3 phase, 50 cycles, also Electric Salt Bath Furnace, 60 kW., 1,200 deg. C. Box FA395, FOUNDRY TRADE JOURNAL.

WANTED.—Annealing capacity for Whiteheart Malleable, section ¼ in. to 1 in. Gaseous or Can Annealed. Box WA385, FOUNDRY TRADE JOURNAL.

COMPRESSOR to deliver 50/100 cubic feet per minute at 100 lbs. per sq. inch. Midland area. Please state age, location, and price. Box CT386, FOUNDRY TRADE JOURNAL.

MACHINERY FOR SALE

ONE B.M.M. type RD.2 (35 × 25) Turnover, reconditioned recently. Price £3 5s. RICHARD THRELFALL, LTD., Bridgeman Place Works, Bolton.

MOULDING MACHINES

ONE B.M.M. Jolt Squeeze Turnover, Model R.D.5, in new condition. £850.

One B.M.M. Jolt Squeeze Turnover, Model A.T.1, in very good condition. £260.

One Hardynick Rotary Magnetic Swarf Separator. New. £100.

BURNEY MOTORS, 2a, Prior Street, Greenwich, S.E.10. Tideway 1754.

MACHINERY FOR SALE—*contd.*

MOULDING MACHINES

PNEULEC HERMAN Jolt Rollover: 4,000-lb.
B.M.M. Jolt Squeeze Turnover: Type ATO, AT4, AT5, RD3/5.
B.M.M. Hand Squeeze Turnover draw, TO3, 30 × 20 table.
COLEMAN-WALLWORK shockless squeeze straight draw, WT563 and WT563a.
Coleman-Wallwork Jolt Squeeze Turnover patt. draw: WT562a and WT562c.
Coleman-Wallwork Type "CN" Pneu. Jolt Squeeze.
ADAPTABLES: Large and small sizes.
Britannia Hand Ram pin lift 26 in. × 16 in.
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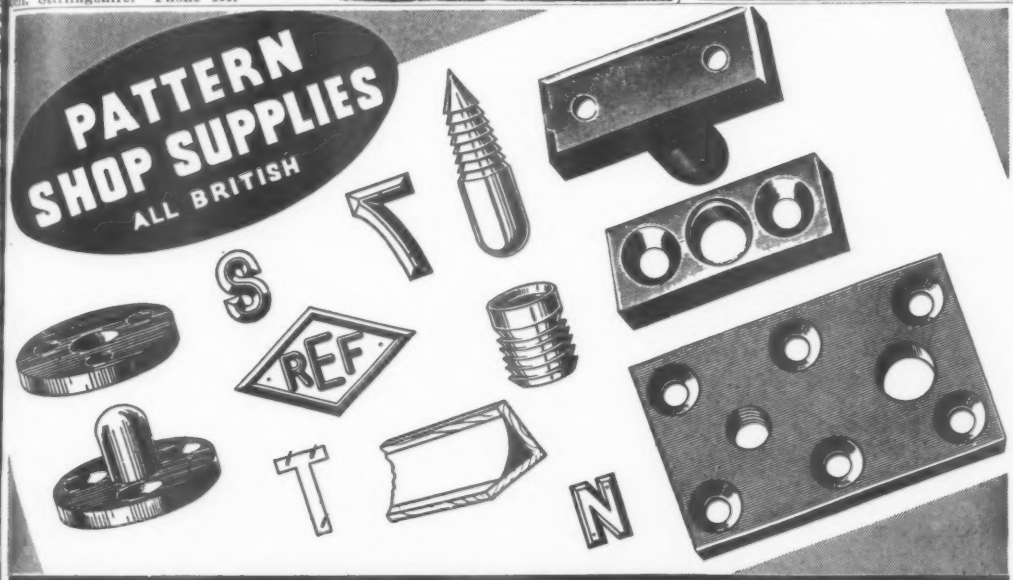

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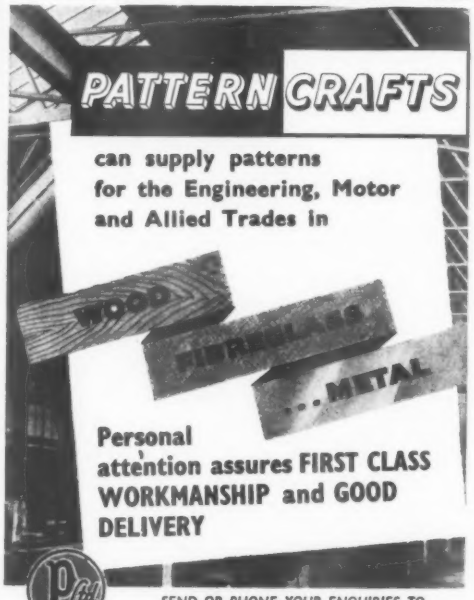
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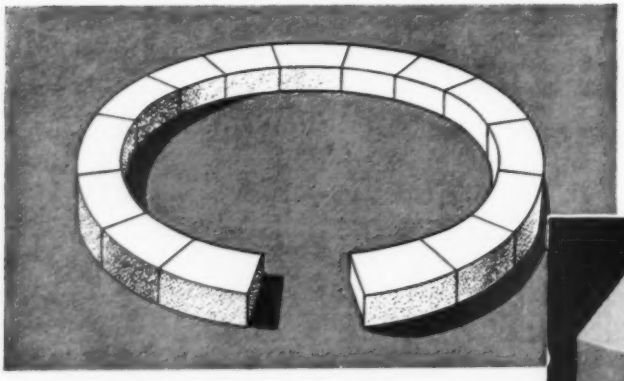

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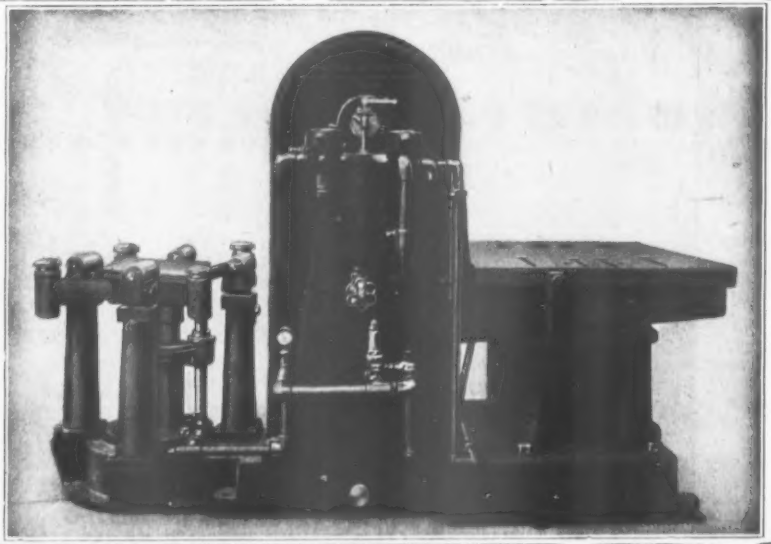

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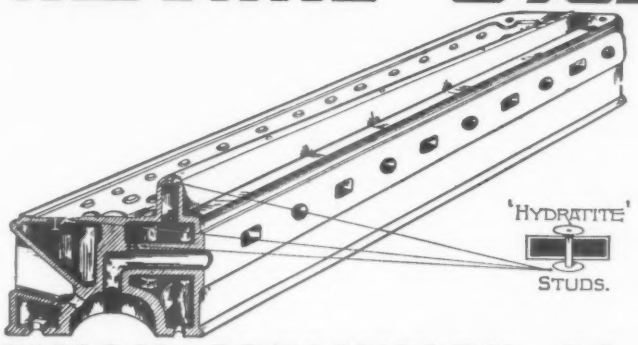

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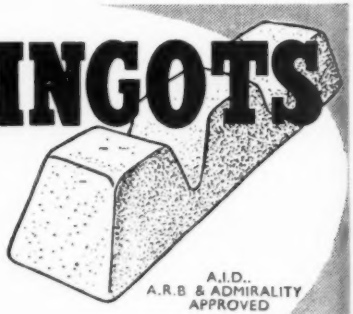

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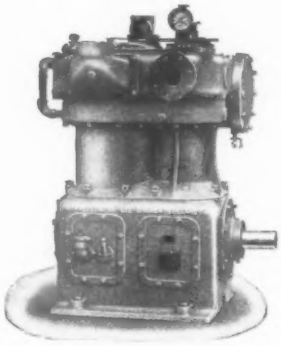

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